Outlines of the history of medicine and the medical profession

Johann Hermann Baas

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OUTLINES

OF

THE HISTORY OF MEDICINE

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THE MEDICAL PROFESSION.

BY

JOH. HERMANN BAAS, M. D.

TRANSLATED, AND IN CONJUNCTION WITH THE AUTHOR REVISED AND ENLARGED,

BY

H. E. HANDERSON, M. A., M. D.

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AUTHOR'S PREFACE.

The history of medicine, of all the branches of that art, is the one to which least attention is devoted by physicians; and yet its study not only possesses great scientific value, but likewise includes an important germ of practical information.

To attain both the objects thus indicated, by bringing to the notice of his colleagues, the practitioners of medicine, the history of their department and their profession, was the original design of the author in the publication of the present work. For those who are interested solely in literary aims his book was not written, and accordingly he has omitted extended bibliographical notices, preferring to refer the reader for these to the larger manuals on this subject.[1] His plan has been to consider first the genetic side of the subject, introducing for this purpose a sketch of even prehistoric medicine, and next to set forth the history of the medical profession in considerable detail. In both departments he has striven to present the subject in such a manner as should awaken and maintain the interest of the reader. Whether he has failed in his purpose or fallen behind the aims which he had set before him it is not for him to decide. No man is perfect; neither is any book. But in so weighty an undertaking as the publication of a work on general history the author hopes for that indulgence which may be claimed, indeed, by every man who has done his work honestly, according to the measure of his strength, and who seeks to appear no greater than he really is.

Of course, for most of the facts recorded in the present work the author is indebted to others. Still he has everywhere preserved the right of independent examination and judgment as to who, among the often conflicting authorities, seems, on the whole, the most reliable. Many things, however, he has proved by reference to the original authorities, and thus made them, as it were, his own. The conception of the history of medicine as a branch of the general history of civilization, a large portion of the history of the profession and his account of the most ancient and most recent developments of medical art, he believes he may also justly claim as original.

That the book has found so conscientious a collaborator, to whom it is indebted for considerable amplification — particularly in the sections on English and American medicine, with which he was, of course, better acquainted than the author — and numerous corrections, is an advantage which no one can better appreciate than the author himself.

The latter trusts that the constellations of the West may prove propitious to his work and enable it to serve the cause for which it pleads.

JOH. HERMANN BASS.

WORMS ON THE RHINE, MARCH, 1889.

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[1] In order to economize space the bibliography of the author's original German edition has been omitted.

TRANSLATOR'S PREFACE.

The object of the present work, so far as the translator is concerned, is to present to the American medical profession a treatise on the history of medicine neither so superficial and "sketchy" as to disappoint, nor yet so voluminous and philosophical as to weary the reader.

The "Grundriss der Geschichte der Medicin" of Dr. Baas seemed to the translator to meet the above requirements more nearly than any other treatise with which he was acquainted, and his proposal to render the work into English met with the heartiest co-operation on the part of the author, whose notes for his own second edition were freely placed at his disposal. How extensive these notes were may be inferred from the fact that they have increased the size of the book about one third, and at least correspondingly enhanced its usefulness.

The sections of the original work on English, and particularly on American medicine have been largely expanded by the translator, and he hopes that these will prove a feature of special attraction to the American reader. In everything the desire has been to render the book a *useful* one, and to this object perfect symmetry and literary elegance have been occasionally partially sacrificed.

The additions of the translator are distinguished by brackets or his initial (except as otherwise indicated in the work itself), and for these he alone is responsible.

No pains have been spared to render the names, dates etc. as accurate as possible, but in a work involving such an infinity of details of this nature it would be unreasonable to expect that some errors and omissions should not be found. For these the translator can merely beg the mantle of that charity which, according to the apostle, "shall cover the multitude of sins".

H. E. HANDERSON.

CLEVELAND, OHIO, JUNE, 1889.

INTRODUCTION AND ARRANGEMENT.

> "Hoc illud est præcipue in cognitione rerum salubre ac frugiferum, omnis te exempli documenta in illustri posita monumento intueri."
>
> Livii præfatio.

THE study of the history of medicine and the medical profession unquestionably offers even to the layman, from certain points of view, many features of interest. In the first place, as an extensive and important branch of the general history of culture, it is indispensable to the historian of civilization, though singularly enough, up to the present time it has not, in this point of view, been duly estimated. It shows itself requisite too for the statesman and jurist, since manifestly they can permanently and properly adjust the estimation and the position of physicians in the state, only by a thorough cognizance of the historical development of their professional relations. It likewise permits the philosopher to see the influence of his science upon medicine, and conversely the influence of medicine upon philosophy—a reciprocal influence which, from the beginning of time down to the present day, has been strongly manifested. Even for the theologian also the study of the history of medicine possesses a scientific value, because it shows that medicine and theology, now it would seem irreconcilably at variance, were in their early periods of development most intimately united, like twin sisters in the womb, whom we are unable for a long period to recognize as distinct beings, and of whom even after birth we cannot say which is the elder, since both were born at the same time. To the naturalist it teaches how the branches of his science, which lift their heads so proudly to-day, were originally mere offshoots of medicine, and have been only recently planted as independent growths upon a soil of their own. Finally it gives to the man of genuine education the best opportunity for judging medical ability and medical activity. An acquaintance with the history of his science is, however, especially indispensable to the practical physician, if he would thoroughly comprehend and penetrate the secrets of his profession. To him, indeed, it is the bright and polar star, since undoubtedly it alone can teach him the principles of a medical practice independent of the currents, the faith and the superstition of the present. Moreover, it offers him as scientific gain, through the knowledge of the past, the measure for a just and well-founded criticism of the doings of his own time, places in his hand the thread by which he unites past conditions and efforts with those of the present, and sets before him the mirror in which he may observe and compare the past and present, in order to draw therefrom well-grounded conclusions for the future.

An acquaintance with the views and the knowledge of epochs already submerged in the shoreless ocean of time, frees the mind from the fetters and currents of the day, with its often oppressive restraint, widens the horizon for a glance into the past, and an insight into the present of human activity, deepens the view for a comprehension of the ideas which guided the earlier and the more recent physicians, and gives, on the other hand, to our daily professional labor a higher consecration, by inserting it as a most useful and necessary link in the chain of development of past and future humanity. The significance of the work of the individual, and his true value and true position with regard to all humanity, are first revealed to us clearly in and through history.

When, however, we have reviewed the labors of thousands of years, and have seen how in their course our science has been advanced, albeit in unexpectedly tedious ways; when too we have found how little service, on the whole, has been rendered to the main object of medicine—the cure of disease—and above all in internal medicine, which enjoys the most extensive field of activity, we are at first sadly disappointed. For in spite of all therapeutics, the word of the Psalmist preserves its internal truth: "As for man his days are as grass: as a flower of the field so he flourisheth. For the wind passeth over it, and it is gone." But on a closer study of the subject, this knowledge awakens another feeling.

For as no other department of the medical sciences is so well adapted to educate the physician in conscious modesty, so on the other hand, none is so fitted to fill his consciousness with just pride in his often contested and self-sacrificing labors. As the history of medicine shows him the inadequacy of medical knowledge and, in the majority of cases, the absolute nullity of medical skill in the struggle with the laws of an all-powerful nature, so it places before his eyes the unwearied struggles of the physicians of all ages—struggles to investigate those laws, and to appropriate to the healing and blessing of suffering humanity the knowledge already acquired, or to be acquired, thereby. Hence we prize infinitely less the fact that history, among almost all people, presents to our eyes the immortal gods as the authors of medical art, than that it teaches us how mortal men have struggled continually after god-like aims—the prevention, the cure, or at east the alleviation lof the woe and suffering imposed as an unavoidable heritage, and in a thousand different forms, upon us created beings—even though to-day, as in the past, these aims have been only imperfectly attained. The history of medicine also teaches us to honor, indeed to admire, humanity, particularly physicians and their past and present struggles, while our daily practice and the daily actions of individuals might perhaps readily lead us to an opposite feeling. It shows us how many a noble man has served medical science, and art, and humanity, devoting his self-denying strength and life to the sick, the feeble, the persecuted, the poor, and the insane, and performing deeds which have not, indeed, dazzled and carried away the multitude by their brilliant results, but have worked on quietly and beneficently through all futurity, leading humanity nearer to the lofty aims of humane thought and action. For the consolation of these men there has often remained only the beautiful saying, that even had their life been glorious, yet it would have been but labor and sorrow.

In like manner history brings before us those spirits who have struggled for such noble aims throughout the whole course of the known centuries, both the highly-gifted, victorious and great, who have borne aloft before our eyes the brightness of their immortal names, and those who, less favored by nature, have shone with a more modest light, and must thus be sought for in their homes, only that we may learn to prize and honor their struggles and their perseverance the more freely, because their desires were supported by less eminent natural endowments. History shows us, too, those whose actions have shone with a false and almost unearthly gleam in times of intellectual night. It teaches us how those spirits strove to recognize—and in some small degree did actually recognize—the forces acting upon and in man, how they pointed them out, and utilized them, how in the midst of, and in spite of this constant struggle and search, that saying from the mouth of the most gracious of mankind has proven its eternal truth: "Fragmentary are all our knowledge and our actions, and our gaze ambiguous as in a mirror."

Thus change in our views seems to be the only permanent phenomenon, and in no science has the maxim: "Much arises which has already perished, and what is now honored is already declining," attained such extended verification as in the very science of medicine. Even so in this same science has been proven the truth of that other saying: "As long as man struggles he errs". To err in its struggles after the truth is, however, according to the resigned expression of Lessing, the portion of humanity, and absolute truth is of God alone.

This observation, however, ought not to discourage us. On the contrary it should spur us on, that each individual, as a member of the great whole, in the flight of moments, days and years, may add his allotted share, however great or modest it may be, to the completion of the work of thousands of years of pure sense and sincere heart. For a thousand years are, indeed, to humanity "as a watch in the night. Thou carriest them away as with a flood"; but on history and in history, great and small work equally in the service of that supreme power, whose laws, to our comprehension inherent and active in matter, are but very partially explored and understood—that power to whose purposes, unfathomed, though freely discussed from the origin of the human race, we mortal creatures, living and struggling, dying and vanishing in the twilight of consolatory hopes, are inevitably committed. History—that of medicine included—seems to the mind's eye like an immense wave of past and present action, now strong and rushing, now quietly advancing, with sparkling mountains and valleys deep as night,—a wave whose ebb and flow in the eternity of the past we understand not and can but dimly conjecture. A supreme power, whatever its essence and however named of men, gives to it its direction and individual phases in accordance with a design and purpose to us forever inscrutable. The eternal wave rises up to heaven, it sinks again into the dark depths, bearing mankind ever upon its rolling crest and billowy field, through hundreds and thousands of years, uniting organically with each other the epochs and grades of human development, both past and future. Millions on millions have perished without contributing to the progress of humanity: they have no history. Thousands have promoted at least the foundations of future knowledge: history records their names, for they labored. But only a few chosen spirits have performed the highest services allotted to man. They summed up the past and discovered new and great truths, the intellectual product of many bygone factors of knowledge; they led humanity onward, and thus form the landmarks of its history. The study of the history of medicine, above that of all other medical branches, should give a more ideal direction to our conception of our calling by showing that its duties and its rewards are not to be found exclusively in our daily labors and scanty pay (as is, alas, too often the popular belief), and by pointing out the fact that only in struggles and labors directed to the intellectual advancement of humanity—struggles unnoticed even in the present, and probably, too, long in the future—lie the fertile germs of futurity and a scion of improvement for all mankind.

To the physician is assigned in the first place the difficult, frequently the impossible, task of preserving the corporeal health, and of restoring it when disturbed or endangered by disease; next, and partly necessarily and consequently, the duty of preserving or restoring the faculties of the mind. Impotent, however, as it, alas, often is and must remain in opposition to the irreversible laws of nature—and history teaches most strikingly this impotence—the medical profession when no longer able to supply the technical aid which we think ought to be expected of it, must claim as its right a still higher significance, a duty far above the technical services of its own department—the duty of being in truth and in deed a humane calling. For there can be no doubt that we physicians too are active coworkers in the sublimest task assigned to humanity:

“Dass das Gute wirke, wachse, fromme,
Und der Tag des Edlen endlich komme!”

“That the good may work, increase, profit,
And the day of the noble come at last.”

MEDICAL SCIENCE ON THE WHOLE,

as regards its various phases or epochs of development, may be likened to a large picture, whose atmosphere, tinted by unmeasured distance, displays only a few clearer cloudforms in somewhat definite outlines and masses, while the limited background exhibits in perspective lofty temples, about whose portals wander priests in ample mantles, to guard them from the entrance of the uncalled. On either side appear mighty crags and groups of lofty trees, whose foliage is penetrated by the powerful rays of the noonday sun, while the foreground greets us in undimmed brilliancy and instinct with life. To the distant sky with its cloudy forms we may compare the mythical era of medicine, with its storied gods and demigods of punishment and of healing. To the background, the cognate priestly era, with its sacerdotal physicians and theurgic medicine, and its works hallowed by faith. The middle ground may be likened to the union of terrestial and celestial philosophy with medicine, the philosophic period; and finally the clear foreground, to the scientific epoch, with its practical principles and ideas. These various periods of development with different nations extend over distinct and long eras. Some of these periods with certain people have never been abandoned; others have not been traversed, and still others never attained. All, however, encroach on each other more or less, and the last two particularly are practically distinguished from each other only by adopting as the basis of such a distinction the tendency to abstract philosophical reasoning or to reasoning based upon the observation of the senses. The predominance of the one or the other of these intellectual tendencies then affixes its stamp to the whole period, though a complete separation of the two has never existed.

THE DEVELOPMENT OF MEDICAL SCIENCE

is best traced in some one people, and most easily among the Greeks, inasmuch as a number of their works, following each other in regular succession from the earliest to the later periods of development, have been preserved to us. Thus in the earliest writings we can perceive that the first medical services were of a surgical character, and that these had already attained a certain degree of perfection at a period when scarcely any traces of internal medicine were to be found. That the latter—undoubtedly anticipated by ophthalmology—was also preceded by a knowledge of midwifery, which, indeed, until a late day was generally regarded as belonging to surgery, seems apparent from the early appearance of midwives—and obstetrical goddesses, a species of divinity now, alas, extinct and frequently substituted by individuals of the masculine gender. What we now call internal medicine first developed, at all events, after the mythical or heroic period, and probably not until the end of the philosophic period of Greek medicine. Medical services too in those days were not divided into separate departments, but the various branches were first separated from the original and long pre-existing trunk of general medicine some centuries before the commencement of our era—in the Alexandrian period—to be once more subdivided during the age of the Roman Empire, an age in which the Greeks were almost the sole representatives of medical science. In the course of later ages (particularly in the beginning of the 16th century) this subdivision, in proportion to the increasing material of the science and the greater number of physicians, became still more marked. Indeed at the present day the numerous special departments represent a kind of German 'Bund', within which the unity of medical science and the appreciation of that unity appear and live almost entirely in those medical circles composed of what we call practising physicians, while the great potentates in this medical confederation must, for the most part, be contented to cultivate and to understand their special states, be they larger or smaller, but are often not required to investigate in any way the departments of others.

THE DEVELOPMENT OF THE MEDICAL PROFESSION,

as the practical evidence of the tendency of medical science, naturally took about the same course as the latter itself. For a long period there were general physicians only; then they divided themselves into some few departments; but as the medical profession became overcrowded and began to decline there have always appeared specialists, frequently an infinite number of them.

PROGRESS OF MEDICAL CULTURE IN THE VARIOUS GEOGRAPHICAL DIVISIONS OF THE EARTH.

This followed such a course that, as early as the beginning of the second millennium B. C., northern Africa and eastern Asia possessed an independent medical literature (corresponding to the development of the period), and the countries between the limits mentioned, *e. g.* Palestine, Phœnicia, Babylonia, Syria, Persia, as well as China and Japan, were also at a very early date in the enjoyment of a medical literature, though all did not, like the countries first mentioned, possess a *purely* professional literature. After these, Europe, the youngest member of the old world, was the first to enter upon a medical culture of its own. It, however, in contrast to the others, continued a permanent and wider development. Within the countries of Europe, however, medicine followed the general direction of all culture, tending from the south-east toward the west. In the so-called New World were found only traces of a mythical, theurgic, utterly gross and empirical medicine, whose nutrient vessels, tied, alas, by the whites, were prevented from supporting a further development. The civilzed America and Australia of the present day were (and are still) in great part educated, in both medicine and all other departments of science, by Europe and her sons, though they are now beginning in many respects a development of their own.

While in the earliest ages the Arian stock had attained a tolerably high, and the Mongolian a less elevated, grade of medical knowledge, subsequently the latter race, disappeared utterly from the ranks of progressive medical science—the Japanese, however, seem desirous recently of resuming their lost position—and at the present day the Arians alone, in their various branches, are the sole representatives of such scientific progress.

But even within the Arian stock we do not observe an equal advance among all its branches. The peculiar medical cultures of the Egyptians, Jews, Babylonians, Assyrians, Phœnicians and Medo-Persians, with their respective states and the independent existence of their supporters, have utterly disappeared; the science of the Indians has remained stationary, and the medical culture of the Greeks, with its offshoots the medicine of the Romans and Arabians, existed and in part still exists only in very late, though certainly decided, after-effects. The offspring of the Romans, the Romanic peoples, however, are struggling to-day on even terms with the far younger, and therefore more vigorous Germans, for the olive-branch of victory and the laurel of fame. The Sclaves too have recently entered independently into the struggle, and long hereafter, when the former nations have become old and feeble in the progress of the world, the Sclaves will probably dispossess both the Romanic nations and the Germans of their pre-eminence. The negroes have been from the outset, and now are, without any importance in the development of the medical sciences, as well as in every other way, and the Indians, devoted, alas, to destruction by that vampire of human races, the whites, though intellectually much more highly organized than their destroyers, have exercised no influence upon the progress of medical science. The same remark may also be made of the inhabitants of the Australian archipelago.

As regards the periods within which the different branches of the human race entered upon medical culture, on a general survey the writings still preserved to us furnish for very ancient times the most secure basis. In this way it may be regarded as settled for the Egyptians that some of their extant special medical works were composed in the 17th century B. C. On the other hand the Indians are able to exhibit such works only from the 11th century before our era. The medical knowledge of the Jews (Moses, about B. C. 1500), the ancient Persians (Zend Avesta about B. C. 500), and the Chinese, is scattered through, and incorporated in their religious and poetical writings of very early date, while of the equally ancient Phœnicians no written remains are preserved to us. The Greeks, whose spirit was destined to rule all later humanity, show some traces of medical knowledge in poems whose contents are assigned to the period about B. C. 1000, but they did not begin to create a medical literature proper until the fifth century before Christ. After the death of Alexander the Great (B. C. 323), the city of Alexandria became the chief nursery of medical science. From Alexandria and the schools founded by her pupils, the latter was transplanted among the Romans about B. C. 100. From Byzantium, by way of Alexandria, an offshoot of Greek medicine of historical importance was imported to the Persians and Arabians by the Nestorians, who were banished for heresy in the fifth century and founded or continued schools in Gondisapor and other places. Under the indirect influence of the latter, and chiefly by means of Jewish physicians, there arose in the 9th century the medical schools of lower Italy at Monte Casino and Salerno, which in the darkest periods of the Middle Ages preserved for medicine a secure but narrow place of refuge, until through the Italians in the 14th century human anatomy was created to furnish a foundation for a new science of medicine. The new epoch was also specially inaugurated by the Greeks banished from Byzantium on the capture of this city by the Turks (1453). Henceforth, however, medicine entered upon a broader road and extended its influence over a larger number of people. Among the French, Paré, about the middle of the 16th century, created modern surgery in a method characteristic and valid even down to the present day, while the Englishman Harvey in the following century by his discovery of the circulation laid the foundation of physiology, and Paracelsus, earlier than either, created among the Germans a new science of medicine. Thus general medicine in these lands celebrated a new Springtime and a veritable Easter festival, while preserving the impulse for further development--a development which in power and extent left far behind that of the earlier ages, and seems in our own age to be passing through its proper fructification. In the most recent times, however, the advancing wave of medical culture, chiefly by the aid of American and Australian representatives of the white race, has reached Japan, one of the oldest homes of medicine in eastern Asia, and thus the circuit of the world is being completed, centuries after its commencement.

The form of development of medicine in its entirety may, accordingly, be compared to a tree, whose perennial stem is formed by the Egyptians, Indians, Babylonians, Persians, Chinese, etc., and its tap-root, by which the stock is continued, is represented by the Greeks. From this stock, which first pushed forth the barren shoot of Roman medicine, and subsequently that of the Arabians during its miserable existence in the course of the Middle Ages, there finally developed a powerful branch at the beginning of the modern era, and after its transplantation into the soil of the West. Gradually there appeared five main branches, the Italian, the French, the German, and the English, with the less vigorous Spanish, which originally promised so much, but yet remained feeble and miserable. These first four main branches, with their dependent twigs, now tower above all small and modern civilized peoples and states. But in the formation of the complete crown, as in the system of universal medicine, all people will, at some time, take part.

THE DIVISION OF MEDICAL HISTORY INTO PERIODS

is commonly made in such a way that the era of Antiquity closes with Galen; then follow the Middle Ages of medicine, and the modern history of this science begins with Harvey.

If we look upon the history of medicine as a department entirely separable from the general history of civilization, it is justifiable to fix upon special epochs, and to regard particular services of representative persons within these epochs as special landmarks. The propriety of this idea we certainly cannot deny. Yet the history of medicine may, with equal justice, claim to be exclusively a part of the general history of culture, with whose course, as may readily be seen, it keeps pace, and from which it cannot ever be entirely separated—and we believe that from this point of view the generally received divisions of the latter ought also to be preserved as the most practical in the history of medicine, inasmuch as they have received general acceptance, and maintain the idea of the unity of the history of medical and general culture. Again, the landmarks mentioned above do not limit with absolute truth and precision the beginning and end of the medical epochs in question. For the Greco-Roman medicine e. g., though, like the ancient peoples themselves, it had greatly deteriorated, still existed and exercised exclusive control over medical science long after the days of Galen. It was not until the downfall of the Roman Empire in the West that medical culture was gradually transferred to new peoples, and began a new phase of development upon a new soil. By such phenomena, however, the epochs of a science, as of culture in general, are most distinctly divided. The same thing occurred at the beginning of the modern era, when medicine migrated from Italy to the civilized nations of the Germanic stock, who now control it, and thus won a field for development much broader than in the times past.

Another point of view from which this subject may be regarded, is found in the following facts:

Nations, as regards their services to medicine, may be divided into two sufficiently sharply defined groups, the one embracing those nations who have withdrawn from the stage of history, or who, though still present, no longer manifest any progress or independence in their medical knowledge: the other including those who possessed at one period, or who still possess, a progressive development of their own in medicine.

Accordingly we present the following division:

SECTION FIRST.

The Medical Culture of those Nations whose Development in Medicine is either already closed or is stationary (or not independent). The History of the Most Ancient Medicine and the Medicine of Primeval Peoples.

I. The Medicine of the Egyptians.

II. The Medicine of the Ancient Persians (Chaldeans, Babylonians, Assyrians, Syrians, Medes) and Phœnicians (Carthagenians).

III. The Medicine of the Jews.

IV. The Medicine of the Indians.

V. The Medicine of the Chinese and Japanese.

VI. Medical Views and Economy among other Nations, of whom some have disappeared from history, some are stationary in their development, and others possess as yet no medical culture of their own (Scythians, Kalmucks, Siamese, Turks, etc., etc.).

SECTION SECOND.

The Medical Culture of those Nations whose Development in Medicine has been or is progressive.

FIRST PERIOD.

The Medicine of the Greeks (and Romans) to the Downfall of the Western Empire in the year 476. History of Ancient Medicine.

SECOND PERIOD.

Medicine from the Downfall of the Western Empire to the Discovery of America, from A. D. 476–1492. History of Mediæval Medicine.

THIRD PERIOD. p. 351

Medicine from the Discovery of America to the close of the First French Revolution by the Consulate, from 1492-1800 A. D. History of More Modern Medicine.

FOURTH PERIOD.

History of the Medicine of the 19th Century. History of the Most Recent Medicine.

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SECTION FIRST.

THE MEDICAL CULTURE OF THOSE NATIONS WHOSE DEVELOPMENT IN MEDICINE IS EITHER ALREADY CLOSED OR IS STATIONARY (OR NOT INDEPENDENT). THE HISTORY OF THE MOST ANCIENT MEDICINE AND THE MEDICINE OF PRIMITIVE PEOPLES.

EGYPTIAN MEDICINE.

Πάντα ῥεῖ.—Heraclitus.

Egypt, if not the oldest, is undoubtedly one of the oldest of civilized lands. Mesopotamia may alone with some justification dispute her claim to the first rank in antiquity. If too there is any truth in the hypothesis that, at the dawn of the world's history, the home of primeval man lay to the south-east of Africa, in the region long since submerged by the ocean, it is also probable that the progenitors of the ancient Egyptians wandered into upper Egypt along the course of the modern Bar el Asrek, and establishing here a permanent settlement, founded the earliest home of civilization. The tradition of the Æthiopians that Egypt was one of their colonies supports this hypothesis, as well as the fact that the settlement of the valley of the Nile undoubtedly followed the current of that stream. Recent investigators (including Ebers) suppose, however, that the Egyptians, undoubtedly an Indo-Germanic people, migrated across Phœnicia into their present home. But in language they belong to the Semitic stock.

The extreme antiquity of Egyptian civilization, from which many of the most ancient nations (including even the Greeks) manifestly borrowed a part of their science and their culture, is evidenced by its venerable edifices and monuments, which indicate considerable technical skill, by the records of the dynastic registers, and especially by the medical works of the ancient Egyptians, which have been preserved to our day. These reach back to a period which we can as yet indicate by *trustworthy* figures in the case of no other people; and yet they presuppose a long antecedent course of development, extending from the age of primeval rudeness to the attainment of such a grade of civilization as that by which they were themselves produced. In the great number of their writings already discovered, as well as in the fact that the ancient Egyptians decorated their monuments and mummy-cases with hieroglyphics, we also find evidence to the same effect. Later grades of civilization alone mature a literature so extensive as that which we find among the Egyptians. Indeed this is so considerable that, basing our argument upon it alone, we might defend the view that the Egyptian people, even at the very early period when this literature arose, had already considerably degenerated, and were in fact verging on senescence. For youthful peoples are especially proud of physical abilities, and devote attention to these alone, while it is only nations which are growing old that lay the chief importance upon scientific culture, and are fond of writing. The truth of this statement is confirmed by the history of the Greeks, the Romans, and even by our own age.

In accordance with such facts and considerations, there is no internal improbability in assigning the foundation of the first kingdom of Egypt to the sixth millennium before Christ.[1] An especial ground for referring this event to so early a period, a period of whose medical writings especially we have acquired no knowledge in the case of any other people, may be found in the fact that the sober, earnest and heavy intellect of the ancient Egyptians, as we meet it in their surviving and characteristic works of architecture, sculpture and painting, unlike the boundless vanity of the Chinese, or the overflowing fancy of the natives of India, was not suited to originate supposititious history.

The Egyptians, like all other people, had several divinities who presided over the cure of disease. The principal of these deities, Isis, was at once the sister and the wife of Osiris. For among the Egyptians, as well as the pagan North-Germans (though in contrast with the custom of the Jews), marriages with sisters were permissible and usual even for their gods, and this custom, in accordance with popular prejudice, was adopted or retained by the Grecian Ptolemies. Isis had demonstrated her eminent medical skill by recalling to life her son Horus. Imhotep, the Egyptian Æsculapius, whose temple stood at Memphis, and Chunsu, the counsellor of the sick, were of lower rank. The cat-headed Pacht (Bubastis) and Ape were worshipped as the deities of parturient women or of child-blessedness; for children among the Egyptians were esteemed a great blessing, as they were, and indeed still are, by their docile pupils the Jews. The cat was sacred to Pacht, and this animal was held in such honor that the death penalty was prescribed for killing a "mau" (cat). Thot (Thout, Thuti), a god represented sometimes with the head of an ibis, sometimes with that of a dog, enjoyed greater respect, and was regarded as the inventor of art in general, and especially of the healing art. By many he is regarded as the Egyptian Æsculapius, though he enjoys many peculiarities in common with the Greek Hermes and the Phœnician Esmun.[2]

Thot is supposed to have been the author of the oldest Egyptian medical works, whose contents were first engraved upon pillars of stone. Subsequently collected into the book Ambre or Embre (a title based upon the initial words of this book, viz.: "Ha em re em per em hru", i. e. "Here begins the book of the preparation of drugs for all parts of the human body") they formed a part of the so-called "Hermetic Books", from whose prescriptions no physician might deviate, unless he was willing to expose himself to punishment in case the patient died. This punishment was threatened because the substance of the medical, as well as the religious works of the Egyptians—and the science of the priests united in itself medicine, theology and philosophy—was given, according to their view, by the gods themselves, and a disregard of their prescriptions would be nothing less than sacrilege. The remains of these books[1] are probably preserved to us in the two papyri of Leipzig (papyrus Ebers) and Berlin, especially in the former. The Leipzig papyrus was committed to writing in the 16th century B. C., and is the offspring of an epoch of high civilization in Egypt: for in this same century of Sesostris or Ramses-Miamun[2] (died B. C. 1511) lived and sung the old Egyptian epic poet Pentaur, and Mesu (Moses) was also educated at the same period in Egypt[3] (Lauth). The Berlin Papyrus was committed to writing in the middle of the 14th century B. C., and the substance of both these works is referred back to the fourth millennium before our era. Thosortes (Athotis), who also reigned during the course of this latter period, received the surname of "Imhotep", *i. e.* "physician", in consequence of his medical knowledge!

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[1] The period of Chufu (Cheops), who built the famous pyramid, and had the Sphinx restored, is assigned (according to Buchta) by Lepsius to 3124 B. C., by Brugsch to 3733, by Unger to 4845, and by Champollion to B. C. 5000. Wiedemann takes as the mean date 4845 B. C. Now since the Sphinx at this period already required to be restored, its erection must be referred to a period hundreds, indeed thousands of years before the days of Cheops, for the climate of Egypt (unlike that of America) is very favorable to the preservation of stone monuments.

[2] Esmun was one of the ancient Cabiri, and the Æsculapius of the Phœnicians. Famous temples in his honor stood at Carthage and Berytus. (H.)

The papyrus Ebers is only partially deciphered, but it is believed to have been written between 1550–1547 B. C., and it exhibits to us a compilation, whose contents are the work of several persons, for even an oculist of Byblos in Phœnicia is mentioned as one of the associate authors. In this we have proof that, even at this extraordinarily early period, medical science was international, and that even then (as we see in Ziemssen's Codex to-day) savants of a foreign, though neighboring nation, took part in such compilations. This papyrus compiled under the king Ba-kerh-ra, probably at On (Heliopolis), where was located a famous sacerdotal college (in which, as in the Museum at Alexandria at a later period, policlinical treatment was practised), bears the title given in the preceding paragraph, and contains: remedies for diseases of the stomach, the abdomen, the urinary bladder; for the removal of the glands in the groin (buboes) and the "kehn-mite"; "The book of the Eyes"; remedies for ulcers of the head, for grayness of the hair, and promotion of its growth; ointments to heal and strengthen the nerves; medicines to cure diseases of the tongue, to strengthen the teeth, to remove lice and fleas; remedies for the hearing and for the organs of smell; the preparation of the famous Kyphi; "The Secret Book of the Physician (The Science of the Movement of the Heart, and the Knowledge of the Heart, according to the priestly physician Nebsuchet)"; prescriptions for the eyes according to the views of the priest Chui, a Semite of Byblos, "Book of the Banishing of Pains"; recipes for mouth-pills for women, to render the odor of the mouth agreeable; the various uses of the tequem tree, etc. The papyrus has marginal notes, like "*nefer*" (good) etc., which Lauth assigns to the year 1469 B. C., an evidence that its prescriptions had been tested in practice.

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[1] The "Todtenbuch" (Book of the Dead), also belongs among them. This was "a sort of guide-book, which every Egyptian must possess in order to travel with safety in the other world. The use of this book was extremely simple and ingenious. It was sufficient to have learned it by heart, or to have merely transcribed it, in order to know it after death. For those who had neglected this precaution during life, the son or some other relative performed the service of reading or reciting the necessary chapters at the burial. Finally by the donation of a more or less complete copy of the work, sufficient knowledge of the formulæ inscribed therein was secured to the dead." (Buchta.)

[2] The mummy of Ramses II., Miamun, is still preserved in the museum at Bulaq. The complete name of the king was Ra-Userma Sotep-en-ra Ramessu Miamun A-nachtu (the victor).

[3] A thousand years before this the Egyptians possessed an exercise-book of elementary mathematics (papyrus Rhind), probably composed under Amenemha III. (B. C. 2221–2179). This was copied about B. C. 1700 by a writer named Ahamesu, and its contents, almost word for word, are again found in a book of the Alexandrian Heron. Probably there also existed a theoretical text-book of mathematics in Egypt, which Euclid had at his command. The work first mentioned comprises exercises in the four primary rules of arithmetic, and especially fractions (Eisenlohr). Brugsch has recently discovered in a papyrus the fables of Æsop, which must either have been of Egyptian origin or imported into Egypt from Greece.

These so-called "Hermetic Books" in the post-Alexandrian age, and still later, served as the source of, and a mask for, the vagaries of magic, and the extravagances and frauds of the alchemists. Most of them, however, are forgeries. Apis and Serapis were also regarded as skilled in the healing art, and the ibis was popularly supposed to have been the hallowed inventor of one of the most useful medical operations—the use of clysters—for it was believed that when constipated she administered them to herself with the aid of her long bill.

The magnificent and wealthy sacerdotal schools were the institutions for instruction in medicine. The best of these were located in Thebes "with its hundred gates," in Memphis, Saïs, Heliopolis (Egyptian Anu, Heb. On, now Matarieh near Cairo), and Chennu (Silsilis). They corresponded somewhat with the later colleges of Alexandria, but had a purely esoteric character. We may regard them also as the universities of that ancient period, provided, as they were, with a library, laboratories, boarding-houses for students, etc. Heliopolis especially was considered a school of practical medicine.

The medical knowledge of the ancient Egyptians was tolerably extensive, and gauged by the measure of those early ages, by no means unimportant. It was at all events quite characteristic. Medicine was divided into the science of higher degree (conjurations, dissolving the charms of the gods by prayer, interpretations of the revelations received by the sick during incubation in the temples), and ordinary medical practice.

The highest class of priests (sages, soothsayers), whose privilege and duty it was to study the first 36 Hermetic books, officiated as physicians of the higher science.[1] Ordinary medicine was practiced by priests of the lowest grade, the Pastophori. The latter—hence their name—carried the image of the sacred (sam-) barge in their religious processions, and it was their duty to study the last six of the Hermetic books. These treated of anatomy, pathology, pharmacology (papyrus Ebers ?), ophthalmology, and gynæcology, if we employ modern terms for their designation. There was too still another class of priestly physicians, who followed the army and enjoyed a salary from the state, military physicians. Besides these, there were veterinary physicians, whose methods of treatment are still partially preserved upon the monuments, and who were mainly specialists, fowl-doctors, cattle-doctors, etc. In fact their general system of specialties (as we learn already from the papyrus Ebers) was so complete, that according to the account of Herodotus, there were physicians in Egypt for each part of the body. This specialism is *per se* an evidence of a civilization of high development, indeed of one tending towards its downfall, and in Egypt it attained a perfection which our own system, with all its completeness, has not yet reached. We know that the sick were visited and treated at their homes by the physicians. The latter must first, however, be sent for to the President of the temple, who then selected and despatched to the patient the specialist best suited to his case. The sick were also treated as out-patients in the temples. Persons of rank had their physician-in-ordinary. Whether there were hospitals in Egypt is doubtful; at all events the statement that the sick were exposed in the streets, so that passers-by might impart advice to them and inform them how they had themselves been cured, is opposed to such a supposition.

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[1] Undoubtedly the oldest physicians known to us by name are the primitive medical colleagues and kings Teta and Tseshorta (5th millennium B. C.), Nebsuchet, the Sénac of the Egyptians, and Chui, an oculist.

In consequence of the strict division of castes which stamped its impress upon all the arrangements of the ancient Egyptians, the adoption of the medical profession was permitted to the sons of physicians only, and was associated with birth and hereditary succession. The distinctions of caste were not, however, so rigid as among the Indians, and persons of a lower caste could, by means of eminent services, work themselves up into a higher.

The income of the priestly physicians was partially independent of their "practice," inasmuch as it depended upon the proceeds of extensive and untaxable temple endowments. Besides this, the patients dispensed to the gods (as well as to the priests) votive offerings, which, under certain circumstances, were required to be promised in advance, so that, even at that time, it was customary to chaffer about fees.

Coined money was unknown to the Egyptians before the time of Alexander the Great, but instead of it they made use of weighed rings of gold and silver, of different values. Herodotus reports of the Egyptian priests and physicians: "Their profits are large, they eat the cooked offerings and receive every day many geese and much beef. Wine is also given to them." So they had no very bad time. Such were the ordinary offerings.

A special form of payment or offering, of which examples have been preserved to us, were the so called "anathemata," models in silver, gold, etc. of diseased limbs, feet, hands, or deformed arms, which the sick hung up in the temples for the benefit of the gods. These were then sold anew by the priests to other patients, and again offered to the gods, and so on *ad infinitum*, a primitive, lucrative and pious practice which has been preserved in our pilgrimage churches of the present day, though obsolete in private practice. The object was the same as that sought even to-day in Kevlaar:

> "Whoe'er a wax hand offers, regains his own hand sound,
> And who a wax foot offers, his foot is freed from wound."

Ordinary hygienic measures were daily baths, friction and inunction of the body, abstinence from certain kinds of food, e. g. cow's flesh and pork (though the flesh of oxen might be eaten), the flatulent bean (while the far more suspicious onion and garlic were much liked), and less frequently gymnastic exercises. In addition the Egyptians maintained a simple mode of life and practised a careful system of nurture and hardening from childhood. For the sake of cleanliness linen clothing was worn.

The simplicity of their system of rearing children was so great, that the expense of raising a child to manhood amounted to only about $4,00, an inexpensiveness due chiefly to the cheapness of all the necessaries of life.

Moreover the Egyptians took a purgative and an emetic regularly three times a month (on the principle that all diseases arise from the food, and are to be prevented in this way), and for these, as well as for the daily evacuations, and even for coitus, definite times were prescribed. It is difficult to understand how such prescriptions (especially the last mentioned) could have been carried out in practice, for the ancient Egyptians were very obscene, and, like the Scythians, Persians and—modern students—were very fond of drinking to excess. Beer was the favorite beverage, while with the Persians it was wine. The prescriptions of the Egyptian physicians for the expulsion of vermin from houses and clothing, several of which have been preserved to us, may also be classed under the head of sanitary regulations. In order to avoid deflement before the gods by such vermin, the priests likewise wore linen clothing, and shaved off every day the hair upon their whole body. In epidemics fumigations were practised to purify the air.

In surgery, and especially in operative surgery, the physicians of the warlike Pharaohs[1] accomplished considerable, and obtained results fully capable of refuting the denials of this fact dictated by the self-sufficient national vanity of the old Greek writers. They bandaged suppurating ulcers (ubennu), practised venesection and cupped by means of horns sawed off near the point. They performed circumcision, in accordance with the precepts of their religion, using apparently knives of flint, and they also practiced castration by crushing or pounding the testicles, and more rarely with the knife. In fact this latter operation was performed with such success and dexterity, that, even as late as the Roman period, most of the eunuchs were supplied by Egypt. They practised lithotomy with a dexterity preserved as a secret, and, indeed, performed amputations, as pictures found at Thebes and Denderah testify. In ophthalmic surgery they were especially skilful, and it is highly probable that they even operated for cataract. Imperfectly united fractures and artificial teeth have been found in mummies—the latter an evidence that dentistry and dentists are, at all events, as old as the coquetry for which Egyptian women were notorious. From the preceding remarks we might infer that the Egyptians were experienced in the construction and invention of instruments, but, in addition to this, a great number of surgical instruments have been actually discovered.

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[1] Pharao is the Hebrew form of the Egyptian royal title "Per-aa", "Great House", about equivalent to our modern "Sublime Porte".

The pathological knowledge of the ancient Egyptians comprised a knowledge of fever and of diseases of the eyes, in the treatment of which Egyptian physicians enjoyed special reputation throughout all antiquity. They must therefore be regarded as the earliest oculists. They were even summoned to foreign courts, and furnish us the earliest examples of practitioners who traveled among foreign people. Gray cataract was called an "ascent of the water," out of which the Greeks made a "descent."[1]

The Egyptians were also acquainted with pterygium and the arcus senilis, with inflammation in the vascular parts of the eye, ophthalmic catarrh, lippitudo, smaragdus, or green disease (glaucoma?), blood in the eye, fatty degeneration, granulations and whitening of the latter; with diseases of the heart, of the ears, of the skin (including leprosy, small-pox, acne of the face, eruptions upon the head, erysipelas, itching of the leg, sweating of the feet, etc.); with diseases of the hair, verminous diseases, hæmaturia, dysuria, too frequent urination, the urinary troubles of children; with diseases of the sexual organs, of the stomach, tooth-ache, head-ache, etc.

Under the titles Sti, Hmaou, disease of the Ra, Chatj, Bosou, Zanarojt, Uchedu (pains) etc., are preserved certain forms of disease, whose analogues of the present day cannot be precisely determined. As an example of Egyptian symptomatology we quote the description of the disease last mentioned (gastric cancer?):

"His belly is heavy, the mouth of his stomach is diseased, his heart burns, his clothes hang down loose, even abundant clothing cannot warm him. In the night thirst torments him, his taste is perverted like that of a man who has eaten the figs of the sycomore: his flesh is wasted away as that of a man who is ill. If he goes to stool his bowels refuse to act. In his belly there is inflammation, the savor of his heart is ill: when he rises he is like a man who is restrained." (Haeser.)

The following passage may serve as an example of old Egyptian diagnosis and therapeutics:

"When thou findest anyone with a hardness in his *re-het* (pit of the stomach), and when, after eating, he feels a pressure in his intestines, his stomach (*het*) is swollen, and he feels bad in walking, like one who suffers from heat in his back; then observe him when he lies stretched out, and if thou findest his intestines hot, and a hardness in his *re-het*, say to thyself this is a disease of the liver. Then prepare for thyself a remedy, according to the secrets of the (botanical) science, from the plant *pa che-test* and dates, mix them (*misce*), and give (*da!*) in water, etc." (Ebers.)

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[1] The ancient Greek terms for our modern "cataract" were, *ὑπόχυμα* or hypochyma, and *ὑπόχυσις*, hypochysis, both of which, like the equivalent Latin "suffusio", imply a "pouring down". The use of the Latin "cataracta" or "cataractes" to designate a disease of the eyes, is of comparatively recent origin. The earliest Latin writers in whom I have met it, are Gilbertus Anglicus, and the "Four Masters" of Salerno, both of whom flourished probably in the last quarter of the 13th century. Ambroise Paré says the term cataract was employed by the Arabians. According to Pliny, the Alexandrian herb Anagallis arvensis was employed as a mydriatic. (H.)

We have little information concerning the midwifery of the Egyptians, except that they had midwives (*meschennu*), and that the Egyptian women, who were delicate and luxurious, bore children with greater difficulty than the Hebrew. In difficult cases physicians were also called in, and there were special lying-in apartments. From their gynæcology we know, among other things, certain prescriptions for the promotion of conception, and certain rules for the recognition of fruitfulness, and of existing pregnancy in women. If e. g. a woman takes a drink prepared from the herb *boudodou-ka* and the milk of another woman, who has borne a boy, and—vomits—she is pregnant: if, however, she simply eructates, she is not. (Idiosyncrasy of the pregnant?)

In physiology they held that until the age of fifty years the heart gains annually about two drachms in weight, but that afterwards it loses about the same amount each year, so that finally, in old people, death is occasioned by this continual loss. They also assumed that four demons ruled over the body. Hunger and thirst were not regarded as bodily wants, but as quasi-poisonous substances, which forced themselves into the body and required to be neutralized by eating and drinking, in order that they might not destroy it. A similar superstition also prevailed regarding the dead, and thus these too required food. (Buchta.)

The Egyptians, who did not shrink from human dissection as much as the Greeks, were, indeed, acquainted with anatomy, but not to the degree which we might expect from their other medical knowledge. Yet Athotis, the son of king Menes (lived according to Boekh B. C. 5702, according to Lauth B. C. 4157), who is himself said to have been a physician, had written on anatomy. Both of these were kings, and thus furnish evidence of the high estimation of medicine and of physicians in Egypt. The Egyptians assumed theoretically the existence of two kinds of vessels and nerves (or tendons, *metu*), of which there were in the body from 24 to 32. Such a "metu" e. g. extends from the little finger to the heart; hence the custom of dipping this finger into their libations. They were acquainted with the heart, the lymphatic glands and the crystalline lens of the eye. When we consider the method in which the operation of embalming was performed, it is manifest that the custom could result in no anatomical knowledge, even if the persons who made embalming their business had been of a different class from that to which, as a matter of fact, they really belonged. The bodies of handsome women (when they could not be embalmed by their own sex, as was the usual custom), were never entrusted to the embalmers until three or four days after death. The mode of procedure in embalming was as follows: in the first place it was determined by the friends of the deceased in which of the three prevalent styles the operation should be performed. In the more expensive styles patterns were exhibited for their selection. If the highest style (which cost about $1125) was selected, one of the sacred scribes, hierogrammateus,[1] marked eight lines, one upon the left side, following the direction and length of which an associate from the "disreputable" and most deeply despised caste of the ancients, the "paraschistes," with a sharp stone—an evidence of the high antiquity of the custom—made an incision into the cavity of the abdomen. He then ran away, so as not to be stoned for his offence against the dead. Now began the work of the embalmers —colchytes-- who existed as a guild down even to the time of the Roman empire. The viscera were removed and preserved in canopen, i. e. vases of clay, limestone, or alabaster, the lids of which were decorated with representations of one of the four Genii of the dead—Amset, Hapi, Tuamutef and Khebsennuf—to whom the canope in question was dedicated. After the cranial cavity was cleared of the brain by means of hooks inserted through the nose, the cavities of both the cranium and abdomen were filled with spices. The salters—taricheutes—then laid the corpse in a solution of carbonate of soda, where it was left for seventy days. At the expiration of this period it was again washed in caustic soda, then coated over with gum, and finally wrapped in a cloth of fine linen. The corpse, thus prepared, was placed by the friends in a bivalvular wooden coffin, hollowed out to suit the size and form of the body, and often adorned with beautiful hieroglyphics. The mummy, thus completed, was then placed in the catacombs, where, as we know, they have been found in a good state of preservation after thousands of years. In "embalming of the second class," which cost $300, melted cedar resin was injected into the unemptied cavities of the body, which was then salted down for seventy days, after which the viscera and resin were removed together. "Embalming of the third class" consisted in simply salting the body after it had been washed. Besides these methods, the Egyptians also often buried their dead in the ordinary way. In fact, the poor were even buried in the sand without any shroud, and those possessed of a little means, in arched vaults built of brick. The Egyptians too were the earliest nation to have a belief in immortality, a doctrine which they held as much as 3000 years B. C.

The ancient Egyptian custom of embalming the dead was also preserved for a long time among the Christians. Thus e. g. as late as A. D. 734 the papyrus Copticus was found beside a Christian mummy. With respect to the foundation of the custom of embalming, Herodotus says: "The Persians worship fire as a god, and the burning of corpses is unusual with both people: with the Persians, because they say it is not becoming in the god to consume a dead body; with the Egyptians, because they believe fire to be an animated being, which consumes everything that it seizes upon; when, however, it has eaten its fill, it dies upon its food. Now it is not customary with them to give a dead body to the beasts, and therefore they embalm the corpses in order that they may not be devoured by worms." It was also a question of religious views, and not entirely a matter of hygiene.

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[1] The scribe, from the time of the Egyptians down to the invention of printing, was a very important personage, as he is even to-day in the East, as well as in Italy. He ranks among the learned, and as a professional man.

According to more recent investigations, the custom of embalming was connected with the belief in immortality, which the Egyptians first possessed. The body contains a portion of the Great Intelligence, a divine spark, *chu*, which, inasmuch as by itself it would destroy the body, is enclosed in the soul, *ba*, and thus loses its shining covering. When the man dies, *chu* is freed, and is converted into a demon. *Ba*, however, does not perish, but remains in the dead (under the title *ka*), as a kind of phantom of him to whose body it is united, and hence the body must be preserved. Accordingly the custom of embalming, with the presentation of food and furniture, like chairs, stools, etc., was introduced, for the support and convenience of the souls of the dead. The donation to all corpses was therefore the same in kind, but more or less expensive, and indicated sometimes merely by pictorial representations of the furniture of the dead. The funeral banquets were also designed merely for the support of the *ka*, who was supposed to share in the feast, and to take whatever food was left over. (Richard Buchta.)

Other methods of disposing of the dead were also in common use.

The Egyptians were acquainted with a considerable number of drugs, and had numerous formulæ for their preparation. Prominent remedies were opium, strychnus, squill and vegetable remedies in general, though medicines of animal origin and of a disgusting kind were also employed. Among the latter we may notice the urine of a wife faithful to her spouse (for which a king was compelled to look for ten years among the Egyptian women!), as a remedy for the eyes, the excrement of animals and even whole lizards etc. This disgusting practice need not occasion us much surprise: indeed we ought readily to pardon the ancient Egyptians when we reflect, that in our own boasted age similar, or even worse remedies, e. g. roasted placenta, the juice of fresh cow-dung, human urine mixed with brandy etc., are quite commonly employed in domestic and quack medicine. The Egyptians also made use of metallic preparations like antimony (a paint for the eyes), verdigris, white-lead etc. Ointments, oils (which, in consequence of their excellence, were imported from Egypt by even the Greeks in Hippocrates' time), plasters, pills (mixed with honey and afterwards rolled into form), steam for inhalations, poultices, enemata, decoctions etc., were recognized preparations. The fumigatory Kyphi[1] was especially famous, a fact which furnishes proof that luxury and the cosmetic art, which obtained great vogue in Egypt in later times, flourished also in the earliest periods. Such directions as "In the evening," "The fourth part every four days," were frequently employed, and the quantity of drugs by measure and weight was given.

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[1] The Kyphi was an aromatic compound of varying composition, employed as a fumigatory, as a medicine and in embalming. In the papyrus Ebers it consists of juniper berries, myrrh, fenugreek, mastic, olibanum, raisins, (? *temten*) and several other ingredients not identified. Other formulæ for its preparation are given by Dioscorides and Galen. Among the more familiar drugs mentioned in the papyrus Ebers are also acacia, calamus, coriander, saffron, hyoscyamus, lettuce, mandragora, olive oil, pomegranate, and perhaps the castor oil bean. Castor oil (kiki oil) was used by the Egyptians for burning, and also in inunctions, but not, so far as I know, as a cathartic. A powerful Egyptian poison was the halicacabon, which Ebers believes to have been the *μῶλυ*, moly, of Homer. Pliny speaks of it as a soporific, more active than opium, and the drug is mentioned also by Celsus, Dioscorides and Galen. Sprengel is inclined to identify it with the Physalis somnifera. The identity of Homer's Nepenthe still remains a question to test the ingenuity and profundity of pharmacologists and critics. (H.)

Egyptian recipes for disease of the intestines: Caraway seed, $\frac{1}{64}$ drachm; Goose-grease, $\frac{1}{8}$ drachm: Milk, 1 tenat (about $\frac{2}{3}$ pint). Rub up the seed of the plant tehni (?) with vinegar, and give to the patient. Pomegranate seed, $\frac{1}{8}$ drachm; sycomore fruit, $\frac{1}{8}$ drachm; beer (first brewed by the Egyptians, and drunk lustily), 1 tenat: boil, stir, eat!

These prescriptions too furnish evidence of a cultivated pharmacy, and it is very possible that the Arabians, to whom the invention of this art has been ascribed, only borrowed it from the Egyptians; for it is undoubted that they frequently made use of Egyptian prescriptions. From the fact too that apothecaries are mentioned in the books of Moses it may be concluded that a distinct class of apothecaries existed among the Egyptians, from whom Moses borrowed most of his regulations. There were quite certainly domestic medicine chests among the Egyptians, of which that of the queen Mentuhotep, found in the Berlin Museum, may furnish an example.

In the preparation of remedies, as well as before taking the same, prayer was offered, definite forms for which are still extant. One of these runs as follows:

"May Isis heal me, as she healed Horus of all the ills inflicted upon him when Set slew his father, Osiris. O Isis, thou great enchantress, free me, deliver me from all evil, bad and horrible things, from the god and goddess of evil, from the god and goddess of sickness, and from the unclean demon who presses upon me, as thou didst loose and free thy son Horus."

The "Black Art", however, was punished with death from very early times, and even as late as the reign of Ramses II. Mental diseases were laid to the charge of the demons (*chu*), and amulets were in common use, especially in the treatment of diseases of the nervous system. (Nowadays we employ galvanic belts and metallotherapy—mere varieties of amulets.) Astrology also was called into counsel in the treatment of disease.

From what has been already said the etiological ideas of the Egyptians may be readily inferred, and especially the theurgic character of ancient Egyptian medicine during the period of pure Egyptian civilization.

When, however, Psammetichus I. (B. C. 664–610), by the aid of foreign troops, drove out the princes of the Dodekarchy, and largely diminished the ancient isolation of Egypt—an isolation which, in ancient times, punished with death every foreigner who entered the country; more especially when his son Nechao (Necho) II. succeeded him in 610, and, with the aid of Phœnician sailors, accomplished the circumnavigation of Africa, and began piercing the Isthmus of Suez; finally when Amasis (570–526) received the

Greeks[1] into his country with open arms, the original old-Egyptian medicine began to decline more and more, until after the last Egyptian king, Nectanebus, and the death of Alexander, through the efforts of the Ptolemies, it entirely vanished before the Greek system, to survive henceforth only as a wretched abortion of magic and alchemy. In the Middle Ages, as we know, Egyptian wisdom was regarded as identical with sorcery the search for the philosophers' stone, alchemy and astrology.

II. THE MEDICINE OF THE BABYLONIANS, ASSYRIANS, PHŒNICIANS (CARTHAGENIANS), MEDES AND ANCIENT PERSIANS.

The lands of the central portion of Western Asia, between the Caspian Sea on the North, the Persian Gulf on the South, the Syrian Desert on the West, and the Indus on the East, were in the remotest ages the seat of a high civilization.

The non-Semitic people of Accad (Sumerians) are considered the oldest representatives of this cradle of civilization. Their culture was subsequently entirely adopted by the Semitic races who succeeded them, and especially by the Jews, whose doctrines of the creation, the fall of man, the patriarchs and their names, the flood, the tower of Babel etc., display the greatest similarity to the Assyrio-Babylonian traditions and narratives deciphered from the cuneiform inscriptions.[2] Upon this primeval seat of civilization developed, after the disappearance of the Accadians, the states of the Babylonians (between the Euphrates and the Tigris, south of Mesopotamia); the Assyrians[3] (beyond the Tigris, east of Mesopotamia); and the Syrians (west of the Euphrates). All of these nations belonged to the Semitic stock. In addition to the states now mentioned, we find also developing upon this same region the kingdom of the Medo-Persians (between the Tigris and the Indus), who, however, belonged to the Indo-Germanic stock, and were younger than the preceding peoples.

Babylon, the oldest of these states, at a very early period (B. C. 2000) became a province of Assyria under Ninus. At a later period under Nebuchadnezzar (B. C. 604–561) it again obtained the ascendancy, until finally, under the reign of Nabonides, Babylonia (with Syria under Crœsus) was subjected to the Persian power by Cyrus (Kurusch, Koresch. B. C. 559–529) in the year 538 B. C.

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[1] By the introduction of the papyrus into Greece the Greeks first received a suitable material for permanent writing, as they had received from the Phœnicians the alphabet (a Phœnician word), as a suitable means for the same object (Max Müller). While they received materials and means also from other peoples, so they speedily surpassed them all in the importance of their writings.

[2] The language of the Accadians had become a dead language as early as the 17th century B. C. It was written and read, like the Chinese, from above downwards, and in columns which followed each other from right to left.

[3] As early as B. C. 1900 the Assyrians possessed libraries of cuneiform writings, and astronomical, grammatical and lexicographical works. At a still earlier period they were acquainted with the art of working in gold, silver and bronze.

In the gray dawn of antiquity there immigrated into Babylonia from the North a Turanian people, the Chaldees, whose dominant element consisted of the servants of the deity. The latter thus rose to be an influential priesthood, and accordingly the name Chaldee—the Magi of the Bible—was employed to designate both these immigrants and their priests. The Chaldees were scattered over the provinces of the states mentioned above, and enjoyed great esteem as mathematicians (they adopted the sexagesimal system,[1] because this has the most divisors), astronomers (they prepared the first calendars) and also astrologers, interpreters of dreams and (theurgic) physicians. According to Herodotus, however, the Babylonians had no regular physicians, who visited the sick, but the latter were exposed upon the streets, and interrogated by those who passed. If any of these visitors had recovered from a similar disease, he was expected to counsel the sick as to the means by which he had been himself cured.

The Zend-Avesta (Living Word), composed in the Zend dialect of the old Persian language, and its later and daughter dialect, the Pehlwi, is regarded as a work which originated substantially with the guild of the Chaldeans, but which was committed to writing by Zarathustra (Zerdutscht, Zoroaster), a Destur-Sapetman, i. e. priestly law-giver, who lived B. C. 2500 (?), or at least before B. C. 500, probably in the age of Darius Hystaspes (B. C. 521-485), and was a member of that priesthood. This work was subsequently lost, but afterwards collected from memory into a book of its present form. It now consists of the Yazna (a liturgy), the Vispered (prayers), and the Jescht and Bundehesch (history and cosmology). The medical portion (which must be regarded as common to all the people mentioned above), is preserved in the section Vendidad.[2] The Javidanichired, or Book of Eternal Wisdom, was older than the Zend-Avesta, but has been lost.

The mythology of the Persians distinguishes a good principle, Ormuzd (Ahuramazda), belonging to the light, from whom emanate the good spirits, the supreme Amschaspands (Ahmeschaçpenta), whose decrees are diligently executed by their subordinate Izeds (angels, archangels), 32 in number. Among the latter Korschid, the sun, and Mithra, in the middle between the sun and moon, are especially conspicuous. It also recognizes Ahriman (Angramandscha) the evil principle, darkness, and the supreme Diws (Dews, Dewas), Aschmosch, Egbetasch, Bochasp, Astujad, Tarik,

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[1] From them it passed over to the Greeks etc., and our division of the hour into sixty minutes is a remnant of Babylonian mathematics or astronomy. The double standard or relative value of gold and silver Max Müller also derives from the Babylonians, from whom the Persians acquired it, and first introduced it into practice. With the latter the relative value of the two metals was 1 : 13.5.

[2] This is slightly confused. The remains of the reputed writings of Zoroaster are divided into: 1. The Vendidad-Sadé, consisting of the Vendidad, the Yaçna and the Vispered. 2. The Yesht-Sade: 3. The Bundehesch. The first two are written in the Zend dialect, the last in the Pehlwi. (H.)

Tosius, emanating from him, and to whom Ahriman himself belongs. These Diws convey to men, and are the causes of all diseases, while the cure of the latter is effected by means of the second Amschaspand, Ardibehescht, but through the mediation of the priests (everywhere active in the beginning of medical culture) the Mazdayaçnas (faithful), who employ:

"Trees and herbs. Some are cured by the knife, others by the WORD. For by the celestial or god-like WORD diseases are most surely cured. The most perfect cures are the work of the 'god-like WORD'", since in this way the soul also shares in the cure. Magicians too are regarded as the most excellent physicians. Besides these there were herb-doctors and knife-doctors (surgeons).

Ainyama was called the god of healing, and Thrita, who (like the physicians, his disciples) was highly esteemed, was regarded as the god of physicians.

Besides the statement that Cyrus, out of care for his army, surrounded himself with (military) physicians, we find for later times the information that Egyptians and Greeks came with special frequency as physicians to the Persian court, and that these,—everything has its earlier example—if their treatment was not fortunate in its results, were in similar danger to that incurred by the ordinary physicians of the Caliphs and the physicians of mediæval kings, who, in such cases, were occasionally crucified. In still later times, Jews and Nestorians filled these positions, while about A. D. 1000 they were occupied by the Arabian physicians, among whom we usually include also native Persians.

The Old-Persian medicine too, so far as we may judge from our exceedingly scanty information, was theurgic in its character. Thus e. g. if menstruation in a woman continued more than seven days, this domestic calamity was ascribed to the presence of a demon, and the unfortunate woman was beaten in order to banish him. A woman during the continuance of the lochial or menstrual discharge was regarded as unclean (as among the Jews, and on similar hygienic grounds), while intercourse with pregnant and suckling women was considered sinful. After the birth of a dead child—a dead body was regarded as polluting—the lying-in woman was required to purify herself, i. e. for three days she must enjoy no meat, bread or wine, she must wash, or at least sprinkle her body and her clothing with the urine of a cow; she received as nourishment hot milk, and was brought to the place of purification thirty paces from the fire, water and the holy bundle of twigs, three paces from pure men. Artificial abortion was forbidden. Leprosy was ascribed to offences against the sun, and the sufferer was compelled to live apart from the healthy (Herodotus). Amulets played an important rôle.

"Each city, every province had its Genius; sparkling stones were worn for love of the Genii, and in this way originated the reliance upon, and belief in, the virtues of stones. They served to avert evil, and were especially useful against the venom of serpents and scorpions, the creatures of Ahriman; they mitigated the pains of labor, of disease and of wounds, since it was believed that fire and water, the male and female Genius of nature, were active in them. Hence the doctrine of the Magi as to their composition; hence the prescriptions as to their use; hence the *λιθικά* in the Orphic mysteries, which were transported from the Black and Caspian seas." (Herder.)

The Persians seem to have been especially famous for their knowledge of poisons. The Hauma-drink—a drink prepared from the plant Hauma, which, like the mandragora, was a god—increased fruitfulness, and was prescribed by the physicians for pains in the limbs, catarrhal obstructions and urinary diseases. All very meager traditions!

The regulations of the ancient Persians with respect to medical fees and examinations are known to us more fully than their medicine. The priests alone were very bad pay, a simple benediction sufficing to satisfy their score. All other persons, however, paid well. Thus the chief of a tribe paid with a farm; a local magnate, and a boy of good family, paid one large draught-ox; a house-holder, a small draught-ox; women were to be treated more cheaply. Thus the fee for the lady of the house was one she-ass; for the wife of the chief of a family, one cow; for the wife of the chief of a tribe, one mare (a horse in the times of Darius was worth 50 Persian darics, which, if of gold, were equivalent to five dollars, if of silver, to fifty cents); the wife of the lord of the province paid one she-camel. Thus the famous doctors of that day were able to acquire in the end, in place of our modern stocks, a tolerably fine collection of live stock, especially as it was considered among the Persians the greatest disgrace to remain in debt (and to lie)—an idea which, as we know, is entirely exploded in the present day, at least as regards physicians. Even the veterinary surgeons were not forgotten in the Old-Persian tariff. They too were paid in cattle, receiving for the cure of a large draught-ox, one of medium size; for that of a medium sized ox, a small one, and for the cure of a small one, the value of it in feed; sick dogs (the dog was a sacred animal) must be treated like human beings.—As regards examinations, (which were limited to "practical cases"), any physician who had "cut" three unbelievers, and on these occasions had "done for" them all, failed to pass; if, however, the unbelievers survived, the faithful might give him a trial.

> "At his pleasure let him treat the faithful, and at his pleasure let him cure them by cutting."

These minute regulations seem to indicate a higher education, even in medicine, than we have been aware of up to the present time. Yet it is also known that their other knowledge, especially in architecture, astronomy, technics, postal matters etc., attained considerable height. It is quite possible too that the Persian medicine proper occupied a low position (for only Egyptians and Greeks are known to us as court physicians), and that these regulations as to fees were directed against extortion on the part of the lower native sacerdotal physicians only.

It is well known that the Assyrians also belonged among the most powerful and cultivated peoples of ancient times, a fact indisputably established by the recently deciphered cuneiform inscriptions and the monuments lately discovered. As early as B. C. 2000 such danger from the kingdom of Assur threatened the Egyptians, even then beginning to decline in power and culture, that the subject princes of the Hygschos were compelled to protect themselves against it by the foundation of border fortresses. Yet, in spite of the high position which the Assyrians held among the people, whose writings have been preserved to us, our information with regard to their medical views is very scanty, at least up to the present time. A few traces of their medicine are, however, found in the epic poem "Istar's Journey to Hell," recently deciphered by Schrader. Though identical with Astarte, this goddess among the Assyrians was divided into Istar and Baaltis, the former (the supreme god of the Accadians) resembling the heavenly Venus Urania, the latter, the animal Astarte. Istar presided over sexual fruitfulness and generation. In addition to this medico-mythological information, we find in this epic the following passage relating to the pathology of the Assyrians:

"Go forth, lead her forth to suffer her punishment; disease of the eyes, of the hips, of the feet, of the heart, shall strike her!"

a tone which harmonizes perfectly with that of the Holy Writ, and shows that the culture of all Semitic races is similar in substance as well as form,—a fact which points to their common source (Accad). Here also every disease is a punishment from the gods. This explains how the Jews adopted so many things from the Assyrians (and Accadians?), even the observance of the Sabbath, which was so strict among the Assyrians, that in the cuneiform inscription translated by George Smith it is said:

"The seventh day, feast of Marodach and Zir: Panibu, a great feast, a day of rest. The prince of the people will eat neither the flesh of birds nor cooked fruits. He will not change his clothing. He will put on no white robe. He will bring no offering. The king will not ascend into his chariot. He will not perform his duties as royal law-giver. In a garrison city the commander will permit no proclamations to his soldiers. The art of the physician will not be practised."

Thus on the Sabbath even the sick must dispense with the physician. The following charm may be considered a theurgic remedy against the elementary spirits, who were regarded as the carriers of internal diseases. These diseases, inasmuch as their origin was not directly cognizable by the senses, were inexplicable to the masses:

"Let the witch sit upon the right;
Let her leave the left side free!
Adisina, do thou tie the knot,
Bind up the head of the sick,
His limbs in like manner with fetters!
Seat thou thyself on his bed,
With the water of youth besprinkle him!"

The influence of the elementary spirits, of the so-called Adisina, was also regarded as a general cause of disease—those spirits who,

"In the depths of the sea as in the ether of heaven, are not male nor yet female. Order and custom they know not: prayer and supplication they heed not."

Yet they yield to the charm of the enchantress, who envelops the sick likewise with magic bands.[1] The pain of circumcision (an operation introduced among them, as among all Semitic races) is said to have been mitigated by the compression of the vessels of the neck until the operation was completed. It is worth remarking in the history of civilization that much of the superstition (even medical superstition) cherished by the Greeks and Romans, and descended from them to later nations, had its origin with the Babylonians and Assyrians. (The first book on astrology is that of Sargon I.)

In reviewing the medical culture of the Phœnicians it is important to remember that in the papyrus Ebers it is stated that one of its books is the work of a physician of Byblos. What we know of this book permits us to conjecture much more important medical knowledge than has been heretofore suspected in this Semitic race, distinguished for its technical, nautical and meteorological knowledge, as well as for its activity in colonization, its commerce and its luxury, and which also exercised an important influence upon the Greeks. That the Phœnicians indulged in an extremely sensual religious worship is known. In their disgusting cultus of Phallus and Astarte (Mylittacultus) they worshipped the visible instrument of male procreative power, viewed in a religious light. It is also known that their supreme deity Baal-Zebul, the Beelzebub of the Bible, was a god of medicine, and was interrogated by even the Jews as an oracle of health and disease. His priests were clad in red clothing (the earliest example of the red garments of the physician ?). Their special god of medicine, however, was Esmun, the eighth of the Cabiri (identical with the Idæan Dactyli, Corybantes, Curetes), who, in female attire reaching to the feet, with shaven heads and exhibiting an erect phallus, challenge comparison with certain modern black-clothed Cabiri, save that with the latter the distinctive phallus slinks away into privacy. The ancient Cabiri also occupied themselves with serpent charming, rather than with other arts and medicine.

The Phœnicians were, as we know, the inventors of writing, an art which, when compared with the Egyptian hieroglyphs and the Assyrian cuneiform writing, may claim for ancient and mediæval times the same importance in the history of civilization as the art of printing compared with the handwriting in vogue up to the period of its discovery. The Phœnician writing, too, was the model for the letters of all later peoples.[2]

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1. A very striking similarity with the first Assyrian incantation is found in the following charm coming down from the Merseburg incantations and German pagan antiquity: "Einst sassen Idise (Weiber), sassen hier und dort; einige banden Bande," etc. This probably points to prehistoric relations.

2. The ancestors of the Phœnicians, who were settled for an unknown period on the shores of the Persian Gulf, possessed antique universities as early as B. C. 2000. These were located upon the islands Tyros and Arados, two of the modern Bahrein Islands. A third island, called Dilmoun, situated on the coast of Susiana, a short distance from the mouth of the Tigris, was also devoted to sacerdotal in-

Of the medical customs of the Carthagenians, who were Phœnician colonists, we know nothing more than that the same deities, even in medicine, were worshipped by them, and in a manner differing but slightly from that of the parent stock. They had certain regulations as to food (according to which e. g. when sitting to administer justice, or when in camp, they must drink plain water), a religious and hygienic institution common to all Semitic people down to the present day. We may find evidence that the connection between the mother and daughter state continued to a late period in the fact that the Carthagenian Mago (between B. C. 250 and 140) had written in the Phœnician language a book on rural economy, including veterinary medicine. This was subsequently translated into Greek by Cassius Dionysius (about B. C. 100), and still later an epitome of it was published by Diophanes.

III. JEWISH MEDICINE.

If views are divided as to the route by which the Egyptians immigrated into their country, it is well established with regard to the Jews, that, wandering as nomads from the regions bordering upon the middle Euphrates and Tigris, they came at a very early period by way of Palestine into Egypt; that, after a short sojourn here, they returned to Palestine, and that they subsequently (B. C. 1900) revisited Egypt for a long period. From Egypt (upon whose monuments their name has been re-discovered in our own day under the title 'Aperu, Aperiu, i. e. Hebrews) they were again, after the lapse of four hundred years, and after they had become a numerous people, led back by Moses (Egyptian Mesu, B. C. 1560?—1480, or 1531—1450), their great and terrible lawgiver, a pupil of the Egyptian priests, whose doctrines he partly and almost literally adopted. This man, the elder of the two world-renowned founders of religion among the Jews, as a statesman looked at medicine from the purely political standpoint only. After completing his education in the golden age of Egyptian culture, he did not, as we know, lead the Israelites to the completion of the conquest of Canaan, and did not survive to see the political independence of his race. Yet this very fact rendered his laws only the more secure from change, and more indisputably binding—a statement applicable not only in religious matters but also in medicine.

The medicine of the most enduring and most persistent, as well as the most pliant race of all the people of history, a people scattered throughout the whole world and adapting itself to all circumstances, yet always preserving its exclusiveness, its ancient God and his commandments — the medicine of this people, I say, was far different in its character during the complete independence of the Hebrew kingdom, from what it appeared

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struction. In these ancient universities astronomy was diligently cultivated, and we owe to them the invention of the zodiac, with its division into signs, degrees and minutes, the division of the day into twelve equal hours etc. (Maspero). (H.)

after this period had gone by, and when an intermixture of this obstinately faithful nation with its neighbors of a more highly cultivated stock could be no longer avoided. Such was the result first of the Assyrian captivity (about B. C. 722), and subsequently of the Babylonish captivity (about B. C. 604). But Jewish medicine was never a science of indigenous growth. The most eminent representative of the Semitic race, like all its other branches, lacked any conspicuous and independent scientific creativeness. In the period after the complete dispersion of the Jews the influence of Greek science predominated in its teachings.

The first of these two periods furnishes us the medicine of the Old Testament; the last, the medicine of the Talmud. The former manifests plainly its origin in the priestly schools of Egypt, and just as clearly its conformity to Assyrian ideas. It displays pre-eminently the purest character of priestly (theurgic) medicine, and in this respect surpasses even the Assyrio-Babylonian and the Egyptian, its models.

The Semitic race, especially the Jews, exercised, as is well known, a controlling influence not only upon the faith, but also upon the superstition of the West, and thus the greatest portion of the mystic ingredients of all medical art is to be referred to the Semites, in the same degree as its scientific and artistic elements are referable to the Greeks.

Old Jewish medicine too was almost exclusively a medicine of the State, not a private profession. Talmudic medicine, on the other hand, gave undeniable precedence to Greek methods and Greek science, and excluded what we may call Jewish medicine from further development.

As the old Jewish medicine, originally borrowed in all probability from peoples already highly cultivated (Egyptians, Assyrians and Babylonians), lacked a mythical phase, so also, in consequence of its strong and all-pervading monotheism (characteristic of the Semitic race in general, as well as of the Egyptians, who were in this respect the teachers of the Jews), it lacked mythical representatives. Accordingly Jehovah (the god of light, Ra, according to Lauth), of whom it is written "I, Jehovah, am thy physician," is alone to be regarded as such a representative. Among his people, too, who originally lacked a belief in immortality, He was regarded as a general cause of disease. He punished with diseases the transgressions of his commandments, and thus it comes that Christian etiology down to Luther, and even later, considered diseases a punishment for sins. This irascible Deity,[1] as a punishment for violation of his commands, utters, by the mouth of Moses, the following threats:

"The Lord shall make the pestilence cleave unto thee, until he have consumed thee from off the land whither thou goest in to possess it. The Lord shall smite thee with consumption, and with fever, and with inflammation, and with fiery heat, and with the sword, and with blasting, and with mildew; and they shall pursue thee until thou perish. . . . . The Lord shall smite thee with the boil of Egypt, and with the emerods, and with the scurvy, and with the itch, whereof thou canst not be healed. The Lord shall smite thee with madness, and with blindness, and with astonishment of heart. . . . Thou shalt betroth a wife, and another man shall lie with her." (!!!)

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[1] The translator, while recognizing the truthfulness and justice of the author's frequent and bitter arraignment of the folly, wickedness and bigotry of the mediæval Church, feels called upon to disclaim, once for all, any sympathy with the agnosticism which mars, in his judgment, this and a few other passages of an otherwise excellent work. (H.)

From the theurgic character of this medicine it is self-evident that, during the earliest epoch, the Levites[1] alone could act as physicians. They officiated in the public service exclusively. Of any private medical practice on their part, at least in the earlier periods of Jewish history, nothing is known—a fact which finds no parallel in the case of any other people. The Levites examined cases of leprosy, investigated the purity of men and women, sexual maturity etc. A Levite practising as a physician must not be blind of one eye, nor have his vision impaired; nor could he pursue his investigations at early dawn, nor in the evening twilight, nor even within a chamber on a cloudy day. King Solomon (reigned B. C. 1020–980), who cured diseases by exorcism,[2] and the prophets, in special cases, were also called physicians. Thus Elisha awakened the son of the Shunemite woman from apparent death, and cured the Syrian general Naaman of leprosy by bathing in the Jordan. Elijah and Ahijah also supplied prophetic prognoses. After the two captivities, and the consequent contact of the Jews with foreign nations, there arose also a class of temple physicians and special surgeons. In the latter centuries before the Christian era there were also city or communal physicians and surgeons.[3] They must have been held in high esteem, for Jesus, the son of Sirach (2–3 century B. C.), who was a physician and savant of Egypt, characterizes these later physicians and their social position as follows:

"Honor a physician! . . . . The skill of the physician shall lift up his head, and in the sight of great men he shall be in admiration. . . . . When thou feelest sick call upon God, and bring the physician: for a prudent man scorneth not the remedies of the earth."[1]

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[1] The individual tribes had special banners. That of the Levites bore the colors of the German empire, though differently arranged.

The view stated in the text is denied by Wunderbar (Biblisch-talmudische Medicin), and is also questioned by Trusen (Die Sitten, Gebrauche und Krankheiten der alten Hebraer). Certainly the cases of king Asa (965-914 B. C.) and Jehoram (896-884 B.C.), as recorded in II Chron., xvi, 12 and II Kings, viii, 29, would seem to imply the presence and activity of other physicians than the Levites. (H.)

[2] The Talmud often mentions a medical work entitled "Sepher Rephuoth", ascribed to the pen of king Solomon. (H.)

[3] In Talmudic times, although every physician, as a rule, practised surgery also, there still existed a few special surgeons, who devoted their entire attention to surgery. The latter were called "Uman", while the physicians bore the title of "Rophe-Uman", or simple "Rophe". Both classes of medical men were under the immediate jurisdiction of the local courts of justice (Beth-Din), without whose license no one was permitted to practice. Each city was compelled to have at least one "Rophe-Uman". The Talmud also mentions Ila, a veterinary surgeon of Jabne. (H.)

In contrast with this enthusiastic panegyric, we meet among the Hebrews, as among all cultivated people, satirical remarks upon physicians, such as the following from the Bible itself: "Physician, heal thyself!" - the sharpest and curtest satire!

There were midwives as early as the period of the sojourn in Egypt, e. g. Shiphrah and Puah; but instead of rendering assistance to lying-in women, "in difficult cases they comforted them until they died" (Siebold). Delivery took place either upon the delivery-stool, or upon the lap of another woman. The new-born infant was rubbed down with salt.

Obstetrical operations seem, however, to have been entirely unknown; for even in cases of prolapse of the hand everything was left to nature. When Tamar e. g. is said to have borne twins, the midwife merely bound a red thread around the prolapsed hand, and then allowed it to return. Inasmuch as the Hebrew women, then as now, bore children easily and often, operations were superfluous. A special blessing as respects child-bearing rested, and still rests, upon the people of God. The Jews of the old kingdom were also by no means so effeminate and luxurious as they are to-day.

Besides the diseases preserved in the passages of the Bible quoted above, the Hebrew pathology mentions "The Egyptian plagues" as the oldest of epidemic diseases, though the precise nature of these plagues is unknown. We read also of the "Plague of Baal Peor" (which the Moabitish women were careful to communicate to the children of Israel, as a memorial of their love); the "Disease of the Philistines"; the "Disease of Saul"; the "Disease of Nebuchadnezzar" etc., and especially "The issue of the body", "The white issue", the disease of the (male and female) flesh, and its bastard form, the "White and red leprosy." The symptoms of the last two diseases are described as follows:

"And the priest shall look on the plague in the skin of the flesh: and if the hair in the plague be turned white, and the appearance of the plague be deeper than the skin of the flesh, it is the plague of leprosy, ... And when the flesh hath in the skin thereof a boil, and it is healed, and in the place of the boil there is a white rising, or a bright spot, reddish-white, then it shall be shewed to the priest; and the priest shall look, and behold if the appearance thereof be lower than the skin, and the hair thereof be turned white, then the priest shall pronounce him unclean: it is the plague of leprosy, it hath broken out in the boil. . . . . But if there be in the bald head or the bald forehead a reddish-white plague, it is leprosy breaking out in his bald head, or his bald forehead" etc.

The symptoms of the benign scab are:

"And when a man or a woman hath in the skin of their flesh bright spots, even white bright spots, then the priest shall look; and, behold, if the bright spots in the skin of their flesh be a dull white, it is a tetter, it hath broken out in the skin: he is clean."

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[1] A farrago from Ecclesiasticus, part of which is not found in our English version. See Ecclesiasticus, chap. xxxviii. (H.)

According to the views of Pfleiderer (in "Die Philosophie Heraklit's etc., '85), the author of the book of Wisdom was a Hellenistic Jew of the first century B. C., who likewise wrote the 2d and 4th "Pseudo-Heraclitan" letters. (Baas.)

It is said of Moses, that his eyes in extreme old age were not darkened, an indirect evidence of a knowledge of presbyopia, or senile cataract.

The above descriptions lead us to that branch of medical science, which was of all the best cultivated among the Jews — public hygiene or medical police. It corresponds to the reality, in both the actual and chronological point of view, to consider the Jews (Moses) as the creators of the science of public hygiene.

The regulations of this branch relate especially to the leprosy "of men, houses and clothing", to sexual intercourse and its abuses, to bathing after coitus and to pollutions, to the marriage of kindred (forbidden also among the Egyptians and Phœnicians), to the situation of cemeteries, the time of burial, the isolation of the sick, the use of vessels employed by the latter and to cases of doubtful diseases. Here too should be included the strict regulations regarding the kind, and mode of preparation, of food and of slaughtered animals, as well as the precepts relative to permissible animals and their mode of death — regulations which must be studied by their rabbis and butchers even at the present day.

The attainments of the Jews in surgery were exceedingly scanty. Of operative measures, only "The Seal of the Covenant", an expression applied to circumcision (an operation which they probably adopted from the Egyptians and performed with a stone knife), seems to have been practised. Castration was likewise at least known to them, though they were forbidden its practice. The Jews were also acquainted with hernia, and its existence occasioned expulsion from the congregation. Their knowledge of obstetrics was likewise scanty. In their doctrines relating to child-bed (the management of which was again regulated especially from the hygienic point of view), the red and white lochia were distinguished, and it is stated that the former continue after the birth of a boy seven days; after that of a girl, fourteen days. The white lochia are said to continue after the birth of a boy thirty-three days; after that of a girl, sixty-six days. In the nearly related science of gynaecology, we learn that they distinguished between menstruation and metrorrhagia. These latter discharges, even after their cessation, render the woman unclean in the eye of the law for seven full days, and during their continuance are guarded with dreadful severity against a characteristic of the Jews — Moses knew his people! — as the following passage will testify:

> "And if a man shall lie with a woman having her sickness, and shall uncover her nakedness, he hath discovered her fountain, and she hath uncovered the fountain of her blood: and both of them shall be cut off from among their people."

In contrast to the Greeks and Romans, artificial abortion was forbidden.

In consequence of the stern prohibition against contact with the dead, a Jewish anatomy is not to be thought of: The bones and vessels only are very vaguely mentioned (Job x). Nothing too is known of any Jewish physiology. But the almost complete absence of a pharmacology among the Jews is remarkable; for they were acquainted with a great number of plants, and the Egyptians, among whom they lived for so long a time, had a very large number of remedies, which they might have appropriated. Figs, the heart, liver and gall of fishes, are mentioned as medicines, and bathing in the Jordan as a remedy for leprosy.[1] This lack of remedies is, doubtless, to be explained by the purely theurgic character of Hebrew medicine. Yet the mortality of the Jews was not, for this reason, any greater than that of other people who employed "remedies" in abundance. At a later period, when the belief in demons had been introduced among the Jews by the Chaldæans, oracles for the cure of diseases were sought even from Beelzebub, and there were then also witches for men and beasts.

A bond of union between the ancient medicine of the Jews and that of the Talmudists is found in their common tendency to religious law, and although Talmudic medicine is substantially quite distinct from the older form of Jewish medicine, it seems proper, for this reason, to include it in the present chapter. The erection of colleges for the preservation and explanation of the pure faith, necessitated by the destruction of the temple at Jerusalem and the simultaneous downfall of its schools, was the occasion of the origin of the learned Talmudic medicine. Although, in consequence of the dispersion of the Jews, these schools were founded in places widely separated from each other, — at Jabneh near Jerusalem, Nahardea in Mesopotamia, Mathæ-Mechasja on the Euphrates, Sura, Alexandria and Tiberias; Rabbi Gamaliel taught at Jabneh, the Rabbis Simeon and Jehuda Hakkadosch at Tiberias, Rabbi Abba Aricha at Mechasja, Rabbi Samuel at Nahardea, Rabbi Asche at Sura, Rabbi Tudus at Alexandria, Tobias of Modaim near Jerusalem (about A. D. 185), who belonged among the followers of Erasistratus, Channina Ben Chama, about the same period, who inserted natural and wooden teeth[2] — they still maintained with each other a spiritual union. Their golden age falls within the first five centuries after Christ. These colleges, however, did not remain free from the influence of other oriental people, and especially did not escape that of the Greeks. — The sect of the Essenes (Therapeutæ), which gave a special character to the medicine of the later period of Antiquity, arose, about B. C. 150, from an intermixture of various philosophical views. To this subject we shall revert hereafter. — The Talmud originated in a compilation of all the interpretations, traditions and decretals of the Rabbis, originally entitled Mishna, and completed between A. D. 200 and A. D. 250. Under the title Gemara further explanations of this work were written (A. D. 370–390). These two works taken together formed the Talmud of Jerusalem, which was again revised. At last a final revision produced the Talmud of Babylon, consisting of the Mishna, the Gemara and their successive explanations.

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[1] Music was regarded as a psychical remedy, and sleeping with young maidens was recommended as a means of physical recreation for all men. Wound-balsam was also mentioned as a surgical remedy.

[2] Other prominent Jewish physicians of the Talmudic period were Theudas of Laodicea (fl. A. D. 120), one of the last and best teachers of the Empiric school, who wrote a treatise upon the branches of medicine (*Indicatoria, Curatoria et Salubris*); Rabbi Chanina Ben Dosa, who flourished about the same period, and established the prognosis of his patients by the fluency of his prayers in their behalf; Ishmael Ben Elisha (Ha Cohen, "Rabbi Ishmael"), an anatomist of the close of the first century, whose pupils were distinguished for their acquaintance with anatomy and physiology, and whose school, under the title "Debbe Rabbi Ismael", was held in high esteem among the Talmudists. Tobias of Modaim (mentioned above), the "Tobia Harophe" of the Talmud, wrote a treatise upon the functions of the brain. (H.)

The medical contents of the Talmud are substantially as follows:

Its surgery embraces a knowledge of dislocations of the femur, contusions of the skull, perforation of the lungs, œsophagus, stomach, small intestine and gall-bladder, of wounds of the spinal cord, trachea, pia mater, of fractures of the ribs (all of which were considered very dangerous, unless immediate medical aid could be obtained), of oral and nasal polypi, the latter of which were considered a punishment for past sins. In sciatica a curious direction is given to rub the hip sixty times with meat-broth. Still more singular, however, is the treatment of stone in the bladder, and among the various procedures we notice only the following: catch a louse from a man, and another from a woman; fix the one upon the breast of the woman, the other upon the penis of the man: then let them urinate upon a blackberry bush, while somebody watches whether the stone escapes! Besides the ordinary operations, e. g. venesection, which was performed by mechanics or barbers, mention is made of the circumcision of hermaphrodites, of an operation by which these unfortunate beings might be made capable of coitus, and of the operation for imperforate anus. The execution of the latter operation is described very minutely: the anal region is to be first oiled well, and then exposed to the rays of the sun! An incision is then made of the size of a barley-corn.

The Talmudic pathology ascribes diseases to a constitutional vice, to evil influences affecting the body from without, or to the effect of magic. It recognizes, among other things, the origin of jaundice from retention of bile, and of dropsy from suppression of urine. The latter disease in general was divided into anasarca, ascites and tympanites. Prognostically it is declared that hydrocephalus internus is always fatal, while hydrocephalus externus is not necessarily so: that rupture and atrophy of the kidneys are followed by death; that hydatids of the liver, on the contrary, are not fatal; that suppuration of the spinal cord, induration of the lungs etc., are incurable,—views which may have been based upon the dissection of animals, and may be considered germs of pathological anatomy. Sweating, sneezing, defecation, nocturnal pollutions and dreams promising a favorable termination of existing disease, pass for critical symptoms.

In therapeutics natural remedies, both external and internal, were employed, as well as the arts of magic. The Rabbis, at other times so strict, allow to the sick even prohibited articles of diet, if they have a desire for them. Among their special prescriptions we notice: onions for worms; wine and pepper in disorders of the stomach; milk sucked directly from the teat of a goat in dyspnœa; emetics in nausea; a mixture of gum, alum and saffron in too profuse menstruation; a dog's liver for the bite of a mad dog; injections of oil of turpentine in cases of stone in the bladder; a drop of cold water in the eye in the morning, with warm foot and hand baths in the evening for sore eyes; bleeding and the warm baths of Tiberias. Asafœtida and many other drugs are certainly derived from Grecian medicine; the laying-on of hands, prayer and conjurations are with less certainty due to the same source. In dietetics it was recommended before the age of forty to take more food than drink; after that age, to reverse the habit: after meals to eat salt, and then to drink water freely, but not to work too much, nor to walk, sleep, nor indulge in venery or wine. On the other hand, it is advised to visit the water-closet regularly every morning, and to bathe, anoint and wash frequently.

The anatomy of the Talmudists is based chiefly upon the dissection of animals, though Rabbi Ishmael, at the close of the first century, dissected, or rather "skeletonized" by boiling, the body of a prostitute[1] (dissection in the interests of science was permitted by the Talmud), on which occasion he found 252 (instead of 232) bones. They recognized the origin of the spinal cord at the foramen magnum, and its termination in the cauda equina; allowed two coats to the œsophagus; included the lungs in two coverings, and gave a special coat to the fat about the kidneys. As regards explorative measures, they were very well acquainted with their favorite subject of investigation, and called the uterus—the sleeping chamber; the cervix uteri—the porch; the "seed-vessels"—the store-room; the vagina—the outer house; the hymen (unknown even to the Greeks, but not overlooked by the Talmudists in their very zealous investigations of this region) was called the virginity; the labia majora—the hinges; the prolabia—the doors; the clitoris—the key. The whole female body was compared to—a larder! They assumed the existence of a fabulous "Ossiculum Lus", an indestructible part of the body, believed to serve, like seed, for the reconstruction of the whole body in the resurrection, and called by the Arabians "Aldabaran" (Langer).

In physiology they assume cold, heat, dryness and moisture as component forces. In experimental physiology they point out that removal of the spleen is not fatal, and distinguish between semen and albumen by the fact that the former, under the influence of heat, deliquesces, while the latter coagulates.

The knowledge of the Talmudists in the natural sciences embraces the Mosaic zoölogy, while their botanical knowledge extends beyond the Bible. According to them the elementary bodies are earth, air, fire and water. In midwifery they teach that pregnancy continues 270–273 days, and cannot be determined before the fourth month. As a means of recognizing this condition they give the deeper sinking-in of the pregnant female in walking over soft ground. The fœtus born in the eighth month is not viable. Normally the fœtus lies folded together like a roll of parchment, the hands upon the temples, swimming in the amnion like a nut in the water. Cæsarean section on the living female was practised with success (Israëls), and they were also acquainted with version, evisceration, abortion, moles and monsters (including absence of the extremities, imperforate anus, hermaphroditism, cryptorchidism, hypospadias etc.), which are ascribed to coitus of a demon or beast with a woman, or of a man with a beast. Quite as remarkable, but much more important, is the knowledge of the rabbis in the history of generation and development, as well as in gynæcology. With respect to the first subject especially, their statements seem to depend upon "their own experiments". For example, they say that introduction of the whole penis is not always necessary for impregnation, but that mere introduction of the glans,—what the lascivious rabbis (the discoverer of this learned Talmudic expression must have prided himself no little upon it!) call osculatio glandis—is sufficient. They also declare that pregnancy cannot take place *stantibus muliere ac viro*, a statement which, however, seems refuted by more recent experiments; that the man, by holding on to the right or left testicle, has it literally in his own hands to beget boys or girls; and other similar experiments! The fœtus is supposed to develop from the head, the upper and lower extremities originating in the 7th week, the genitals, mouth, nose and eyes in the 6th week, the first hairs after three or three and one-half months, at which period also the sex may be safely determined. Man originates from the purest portion of the semen, not from the whole fluid, while the white tissues (bones, sinews, the brain, the white of the eye) spring from the male semen, and the red tissues (skin, muscle, hair, the black part of the eye) from that of the female. To this compound body God, however, supplies its spiritual powers! In compliance with the precepts of their religion the Talmudists especially delighted in vaginal exploration with the oiled finger, and in practising inspection of the genital organs. Thus they determined that two hairs, one on the mons Veneris (how in the world did they find it?), and one in the axilla, furnished entirely satisfactory proof of the puberty of the female; that menstruation might occur even in children etc.

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[1] Prostitutes were numerous among the Jews. They were required to veil their faces while walking upon the streets, and to solicit custom only while sitting before their houses. The latter regulation was designed to prevent street prostitution.

The Talmudic directions for practice give evidence of the practical common-sense of these physicians. "Look to your pay, O physician! For that for which nothing is paid, the same never cures"—a maxim which still holds good.

With the medicine of the Talmud terminated medicine as treated in special Jewish works, though in the Middle Ages, as in the present day, Jews in great numbers officiated as esteemed physicians. Thus Charles the Bald (A. D. 822–877) had for his ordinary physician a certain Sedechias. Among the so-called Arabian physicians there were also many Jews, and in Salerno they officiated as teachers, though since then, even down into the present century, such duties have been forbidden to them.[1]

IV. INDIAN MEDICINE.

The land of the sacred Ganges, wreathed in poesy and rich in gods and temples, bred in the earliest ages a highly cultured people, who, even in hoary antiquity,[2] had already made long strides in medicine, and had attained a grade of scientific knowledge, beyond which they have never since advanced. Yet India did not produce her present inhabitants. The Indians, that gentle though tenacious, extraordinarily fanciful, though thorough and profound people of the Indo-Germanic stock, had not their original home in the India of to-day, but immigrated here from the north at a period far from determinable (B. C. 4000?–2000?). After driving out the Dravidas, the dusky inhabitants of the south, they had founded flourishing states in Bengal as early as B. C. 1900 (or according to others,

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1. The medicine of the Talmudists, in its dependence upon that of the Greeks, furnishes us a preliminary *point d'appui* for an interesting comparison of the latter with the medicine of the Indians.

2. Max Muller regards the Indians as considerably older than even the Egyptians. He speaks of a language (from which words have been transferred into our own tongue) which existed "before there was a single Greek statue, a single Babylonian bull, or a single Egyptian Sphinx".

about B. C. 1300.) At this period they were already acquainted with writing, but during the prevalence of the primitive Agni- or Varuna-cultus they knew nothing of the later distinctions of caste. These distinctions, so hostile to development, originated in the establishment of the Brahmanic doctrine of the Trinity, at which period—about B. C. 800—the priests also began to rule. After this time the distinction of caste was much stronger than in Egypt, so strong e. g. that a Sudra who should seat himself in the place of a Brahman, would have had the actual cautery applied to that portion of the body adapted to sitting, or would have had a cut inflicted upon it !—a prelude to the later branding of heretics by Christians ! But a Brahman who took a Sudra merely for a concubine was disgraced. The precepts of Manu (B. C. 700–600) are to be regarded as the law-book of this period. About B. C. 400 the Buddhistic doctrine attained vogue. According to this doctrine, which contrasts strongly with the Brahmanic, all men everywhere have equal rights—and this was a purely moral precept, independent of God ; an atheistic doctrine, which does not pretend to be a divine revelation, but simply a human idea ![1]

Even before this, about the year B. C. 416, the first Greek physician, Ctesias, physician to the Persian court, came to India, and in the year B. C. 327 the yoke of Alexander the Great fell upon the frontiers of that country. About the year B. C. 300 Megasthenes officiated as embassador at the court of Sandracottus.[2] Whether these, or other later Greek physicians became at all acquainted with the medical views of the Indians, or in any way exercised upon them a permanent influence, is very doubtful ; for the Greeks themselves acquired only a scanty acquaintance with Indian views, and could therefore impart to them probably none of their own.

Ctesias reports e. g. that the Indian physicians were especially skilful in the treatment of the bites of serpents, and Megasthenes declares that they live a very simple life, use few drugs, and make their wives as fruitful as can be imagined, while by the administration of certain medicines they could beget boys or girls with inconceivable certainty.

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[1] Its author was the great Sakyamuni (Buddha, died B. C. 412), son of king Dsuhoma of Kapulivastu. It was first elevated to the position of the sole religion authorized by the state by king Azoka (B. C. 259–222) of Magadha about B. C. 250. Since the 9th century of our present era, however, it has been again driven out of India by the Brahmanic religion, so that to-day it is almost entirely exterminated there, and now flourishes only among the Chinese. Discussion of the literature, art, technics etc. of the Indians here would lead us too far from our subject. We will only remark that these were, on the whole, at least equal to, and in many respects far surpassed those of the Egyptians. In poetry, too, the Indians need not dread comparison with the Greeks, if they had only kept their poems within the bounds of moderation.

[2] The Chandragupta of Sanscrit writers. Megasthenes, also a physician, was embassador from the court of Seleucus Nicator. He wrote a work in four books, entitled, *τά Ἰνδικά*, of which fragments only remain. We learn from Megasthenes that in his day a registry of births was kept in India. (H.)

Most important, however, for the Indians was the conquest of their country by the Mohammedans, about A. D. 1000[1] From this period the independence of the people ceased, and the thread of development of their original civilization was cut off.

Indian medicine, if we except the Egyptian, Babylonish and Jewish, is the oldest in the world. Like the others, it is also a priestly medicine. In its whole extent it grew up upon Indian soil, although at a late period, and in special branches, e. g. midwifery, foreign views, especially those of the Greeks, were probably interwoven. The extreme antiquity of origin claimed (in accordance with their peculiarly fanciful chronology) for the oldest of the Indian medical works yet known to us is unfortunately not satisfactorily settled. Were this question determined, it would furnish us, of course, a favorable stand-point from which to decide upon the independence of their medicine. The views as to the period of their composition, however, vary between B. C. 1000 and A. D. 1000. The earlier period seems to be accepted as the more probable, and accordingly, if we select this tolerably certain date as the basis of our judgment concerning the antiquity of Indian medicine in general, we may conclude that it is the fourth in point of antiquity of any known to us.

The medical writings of the ancient Indians are contained in their sacred books, the Vedas, which originated about B. C. 1500, and were preserved by oral tradition until about A. D. 1500.[2]

Of these books there are four: the Rigveda (hymnology), the Yayurveda (science of prayer), the Atharvaveda (science of incantations), and the Samaveda (science of song). There are also later supplements to these books, the Upanishads and Vedânta. The Yayurveda is also regarded as an Upanishad to the Atharvaveda. To the (younger) second of the Vedas belong the Yayurvedas of the physicians Charaka and Susruta, the origin of which is assigned to about B. C. 1000. These are the oldest special Indian medical works of which we have any precise knowledge. Besides these physicians, Agastya, who wrote 38 treatises, embracing the whole sphere of medicine, and Atreya, the author of the Sanhita (a work which mentions many diseases, and says that everything spoken by Manu is medicine), are classed as very ancient professors of the medical art. The oldest of these works (and the source of the other Vedas), the Rigveda, contains simple medical charms:

> "Ye breezes, healing blow, and waft his pain away:
> The gods have sent you forth with stores of healing drugs."

The cold-water treatment of febrile diseases, recently introduced among us as something of a novelty, is apparently mentioned in the passage:

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[1] Under Mahmoud of Ghazni. (H.)

[2] Max Muller holds that in the entire so-called Vedic period, and even later, the Indian works were transmitted by oral tradition alone, that no written documents are demonstrable prior to the time of Azoka (who, according to him, reigned B. C. 259–222), and that the earliest inscriptions originated in his time.

"Healing are the watery billows, water cools the fever's glow,
Healing against every plague, health to thee brings water's flow."

In the Atharvaveda are also found charms, which indicate from the color of drugs their effect upon the body, as e. g. gold-hammer and saffron in jaundice, red remedies and especially red cows in diseases of the vital force (the blood). From the formula "Form to form, force to force" (**rûpamrûpam, vayovayas**) we may even deduce a sort of primitive homœopathy.

Finally, in the following passage we find an ancient and very humiliating trace of the association of physicians with ordinary tradesmen, together with a nice knowledge of human nature:

"Various are the desires of men: the wagoner longs for wood, the doctor for diseases"—an example of the proverbial wisdom of the Indians, of which the best specimens are to be found particularly in the Vedânta.[1]

The medical mythology of the Indians names,[2] as the god of physicians and physician to the gods, Dhanvantari (Danavantra, Danavantri), who, entwined by the serpent Vasuki, leans upon Mandar, the mountain of the gods, which shoots up out of the milky sea. According to tradition, he was sent upon the earth by Indra, when the world was sick, and here educated many physicians, among whom was Susruta, son of the Fakir-king Visvamithra, of whom Heine sings so disrespectfully. Brahma himself was likewise a god of medicine, as well as his son Dakshas, and the two sons of the sun Asvin, together with Buden, whose mother, the wife of Brahaspati, conceived him in adultery with Tschandra. A female "specialist" among the Indian deities was Duti ka Takurani (goddess of the small-pox).

Numerous priests from the caste of the Brahmans, and their sub-castes, the Vaisya and Vaidya, officiated as teachers of medicine and as physicians among the Indians. The Vaidyas, as the higher of the two sub-castes, included the physicians proper, while the Vaisyas, or lower caste, furnished nurses. Besides the practising physicians, there were the ordinary physicians of princes (who had also kitchen-doctors), as well as others who accompanied them to war, that is military physicians. In like manner there were veterinarians, some of them too possessed of considerable scientific attainments. Indeed even the ordinary physicians paid some attention to, or rather wrote upon veterinary medicine, e. g. Susruta. A penalty was imposed upon the faulty treatment of the lower animals, and in India, even to-day, there are institutions for the care of beasts (introduced by Azoka), and, strange to say, for even vermin. Indian medical practice is distinguished from that of all other people of antiquity by the fact that it recognizes no proper specialists, but simply physicians practising general medicine.

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[1] Vedânta, the end, object or philosophy of the Veda. It is a mark of wisdom, too, that these speak not only of a dread of death, but also of a fear of life, which is often more justifiable. As the Indian medicine of the present day is still identical with the ancient doctrines, so the religion of the Indians about 50 years ago recurred to the Vedânta, or Upanishads. For New Brahmanism (Brahmasamâj), begun about 50 years ago by Ram-Mohun Roy, and advanced by Keshub Chunder Sen (died 1882), is nothing but a reformation, *mutatis mutandis*. All of which is proof of the tenacious force of primeval forms of culture.

[2] Like almost all people who live in a state of nature, the Indians practised originally a worship of their ancestors (Max Müller), from which may have developed everywhere the anthropomorphic doctrine of gods.

The study and practice of the Indian physicians, however, are controlled by regulations, which give evidence of a very earnest and worthy conception of the medical profession, and embody truths acknowledged even to-day; yet they impose upon the physician certain external requirements, the estimation of which is characteristic of the childlike mind of the people, though the adoption of some of them would seem, if not necessary, at least useful, for us of the present day. There were demanded of the physician: a fine person, absence of passion, decorum, chastity, temperance, amiability, veracity, consideration for the sick, generosity, diligence, earnestness, freedom from boasting, secrecy, a desire for knowledge, which scorns not even the lessons of an enemy, and above all reflection and independence of thought. Moreover it is said:

> "A physician who desires success in his practice, his own profit, a good name, and finally a place in heaven, must pray daily for the welfare of all living creatures, first of the Brahmans and of the —— cow (a sacred animal also among the Egyptians). . . . . The physician should wear his hair short, keep his nails clean and cut close, and wear a sweet-smelling dress (for this we require no special directions to-day). He should never leave the house without a cane or umbrella;[1] he should avoid especially any familiarity with women. . . . . Let his speech be soft, clear, pleasant. Transactions in the house should not be bruited abroad." (Haeser.) The last advice is found also in the Hippocratic Oath.

Medical instruction, which comprises the learning by heart of the medical doctrines taught orally,[2] is imparted by the Brahmans, and begins in early youth, a regulation which we find again among the Greeks, and indeed in the ordinances of Charlemagne. The pupil must first select a good text-book and then a good teacher. Instruction embraces the theory of medicine and a practical course at the bedside, with the performance of operations on gourds, onions, skins filled with water etc. The pupil must begin to study early in the morning (after having rinsed his mouth, evacuated his bowels and prayed to the cow and the gods), and cease late in the evening. On the other hand the teacher must be extremely careful in the selection of the pupil, and very conscientious in the performance of his duties, a regulation which would do no harm to-day. Conference with fellow-students is enumerated among the means adapted to give the student a better insight into his studies.

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[1] It seems we must ascribe to this ancient source the famous doctors'-staff, which plays so nice a rôle of grave augury in Hogarth's "Consultation". The yellow sun-shade is just being introduced among us.

[2] Even at the present day the Indian students—the Srotriyas—learn the Veda from the lips of their Guru (teacher), never from a manuscript, and still less from a printed edition. Subsequently they again teach it in the same way to their own pupils. Theological students pursue their studies for eight years, and learn by heart about 12 lines a day (Max Müller). Among the Greeks, or Hippocratists, and the scholars of the age of Charlemagne, the methods of teaching and learning were the same, and hence it was ordered that instruction should begin at an early period, because in youth the memory is strongest.

Old Indian medicine, which continues to be practised to-day, is exposed to the greatest danger from the colleges erected since the English conquest. Of these, the college in the Pundjaub was, in 1877, raised to the rank of a university, with the right to give diplomas. The number of physicians of the old and new school, in a population of about 225 millions, amounted in 1881 to 113,579 (1 in 2,250 inhabitants, as in Germany).

The position of the medical profession is regulated by law. In this way e. g. are determined the medical honoraria, among which is reckoned a place after death in the heaven of Indra (probably in those cases, numerous there as here, where no payment in cash is possible). Thus too is determined the penalty for errors in treatment etc. The unfortunate, Brahmans, relatives and friends of the physician are entitled to treatment free of charge. From women also the physician may accept food only. On the other hand the property of one, who, after recovery, will not pay the proper fee, is forfeited entirely to the physician. The Rajahs were expected to watch over the execution of these ordinances, and, since permission to practice in any place was granted by them, they often among the Indians also favored unworthy persons,

"Who flatter the friends of the patient, and are careful to accept a small honorarium, and to ascribe their evil results to the improper behavior of the invalid, not to themselves" (nor to their predecessor in the treatment of the case),—a description which, such is the irony of history, seems drawn, partially at least, from our own daily life. Indian humor demands, in order to render a residence agreeable, that there should be there a rich man who lends money, a Brahman, who expounds the Vedas, and a physician. It also declares that the physician lives by patients, as the sacrificer by offerings, and the discreet man by fools.

Midwives, as a special class, seem to have been wanting among the Indians, but their duties were performed by ordinary women.[1] In somewhat difficult cases, however, as among the Egyptians, male assistance was procured, in which respect the Indians were in advance of the Christians until the 16th century!

The sphere of Indian medicine, if we except the Greek, is the most comprehensive known to us throughout all antiquity. So true is this that it has at different times awakened question as to the genetic connection of the two sciences, without, however, as yet affording any evidence of such a relation. In other branches of science the same question arises; e. g. Greek and Indian mathematics present many points of similarity.—The medical science of the Indians embraces almost all our branches of the present day, though, in accordance with their early period, they naturally are not made such specialties as at present, and are in some respects incomplete and imperfect.

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[1] In villages the wife of the washerman is the official midwife. (Max Müller.)

The Yayurveda of Susruta,[1] a physician who, in consequence of his extensive knowledge, was after death translated among the gods, and during his life was a famous teacher, is the work best known to us. This treatise is divided into six sections: 1. Sutrasthana, i. e. the doctrine of principles; 2. Nidanasthana, i. e. pathology; 3. Sarirasthana, doctrine of the body; 4. Chikitsitasthana, therapeutics; 5. Kalpasthana, doctrine of antidotes; 6. Uttaratantra, conclusion. The materials, however, are not accurately arranged and divided according to this plan. The contents of this work form the basis of the following exposition of Indian medicine.

Its general pathology points out as the characteristics of health, a serene spirit, clear sense and perfect understanding, uniform warmth from a uniform mixture of the fluids and elements, and undisturbed regularity of the secretions and functions of the body. Diseases are divided into natural and supernatural (the work of demons), with subordinate classes, as accidental, corporeal, mental, original and complicating, secondary, internal and external. Pain is considered a symptom of all diseases, and fever a symptom of all severe affections. Etiologically, diseases are ascribed to an unequal or perverted action of the five common elements, æther, air, fire, water and earth. These, however, in the first place, through the influence of food, season, conditions of the atmosphere and the climate, form proximate causes of disease, while corruption of the three "elementary fluids", bile, mucus and air, is looked upon as the remote cause. The latter fluid has a retreat between the hip and anus. Above the hip and anus, and beneath the umbilicus is the seat of "the concocted"; between the concocted and the crude is the seat of the bile, while the seat of the mucus is also that of the crude. If the fluids, separately or together, are corrupted, immediately the "corporeal elements", chyle, blood, the flesh, cellular tissue, bones, marrow and semen are also morbidly altered, and therefore the disturbances of these are conceived of as special proximate causes of disease, through which again the excretions, urine, sweat, fæces, milk and menstrual blood are affected. If the chyle is in excess, the heart becomes sodden; if the blood, the vessels become swollen and the limbs and eyes become livid; if the flesh is too abundant, the buttocks, face, lips, sexual organs etc. increase in size. If the excretions, fæces, milk, sweat, urine and menstrual blood are increased, these corresponding results show themselves; swelling and pain in the abdomen, enlargement of the breasts, increased flow of milk with tenderness, a bad odor and itching of the skin, profuse sweating, debility, frequent and painful urination, and finally inflammation of the lower portions of the body. Other evils arise from draughts of air, water, the passions, bad habits of life, insufficient clothing, unclean dwellings etc.

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[1] E. Haas declares that an old Indian physician Susruta never existed, that the work which bears his name originated in the 16th century and is founded upon Arabian translations and elaborations of Hippocrates. The name Hippocrates in Arabic is Bucrat, from which is formed the Sanscrit Susruta. Conversely, Wise declares that Hippocrates, on his travels, robbed Susruta of such of his teachings as belong to the latter. Thus uncertain is our knowledge of the old Indian medical works! According to Max Müller the most ancient Sanscrit manuscripts are of the 15th century A. D.

Worms also play an important part in the etiology of diseased conditions of the body or its parts, and the existing superstition to this effect, among both the masses and the "educated", probably had its origin in this Indian idea.

The Indians were acquainted with numerous diseases belonging to the department of surgery, such as fractures, lithiasis, hernia, abscesses, ulcers etc. Under the latter head syphilis is thus described:

> "In women the humors resulting from venereal excitement involve the sexual organs and occasion very tender, foul-smelling, fungous growths (condylomata), which secrete a slimy blood. . . . . . The cause of ulcers of the penis is too vigorous intercourse with a woman whose vagina is diseased. . . . . . . Remedies are sulphate of copper and red arsenic. If, however, the member already smells offensive, it must be cauterized with a red-hot probe." Phimosis, paraphimosis, orchitis and epididymitis, fistula in ano, hæmorrhoidal tumors, tumors in general, together with lepra, elephantiasis and wounds are also described.

In the line of instruments, scalpels, forceps, specula, saws, needles, moxas, the actual cautery, enema-syringes and animal bladders fitted with tubes, by means of which injections were made into the bladder, just as in the present day, etc. are known, but the hand is very properly distinguished as the best of all instruments. In respect to form, too, instruments are adapted to the requirements of every operation. Operative surgery attained such a position among the Indians that they did not shrink from the greatest and most difficult operations. We may notice first the dressing of wounds, concerning which the Ramayana[1] says:

> "The wounded in battle should be quickly picked up, carried into a tent, the bleeding stayed, and upon the wounds should be dropped an anodyne oil with the juice of healing herbs."

Next we may quote the apothegm:

> "The fire cures diseases which cannot be cured by physic, the knife and drugs."

—a saying which reminds us of the well-known Hippocratic aphorism.[2]

Under this head are embraced also the minor surgical operations, such as venesection, extraction of arrow-heads, piercing of the ears, opening of abscesses—in those of the breasts avoiding the milkducts—besides checking hæmorrhage by pressure and cold, the bloody suture and paracentesis abdominis. We observe, moreover, that attention was paid to even the lodging and situation of those operated upon. The Indians also knew and practised (though not very satisfactorily) the operative treatment of harelip, oto-, cheilo-, and rhino-plasty, herniotomy, laparotomy, the extirpation of tumors, removal of the ovaries in women in order to restrain their lust (an operation practised also for the Lydian kings),—another "modern" operation so early performed! — the operative treatment of fistula in ano, cataract, and other operative procedures. Among the latter, however, we may distinguish lithotomy in men. For the latter the high operation was prescribed, while in women the incision was to be made through the urethra or vagina:

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[1] The Ramayana is the greatest of the Indian epic poems, ascribed to the poet Valmiki, who is supposed to have flourished about B. C. 250. It contains no less then 24,000 verses, devoted to the history of Rama. (H.)

[2] "Quæ medicamenta non sanant, ea ferrum sanat; quæ ferrum non sanat, ea ignis sanat: quæ vero ignis non sanat, ea insanabilia reputare oportet." (H.)

"The physician presses with his hand, passing from the navel of the patient downwards, until the stone has slipped down. Then he carries the oiled fingers (the left index and middle finger, the nails of which have been cut close) into the anus,—passing along the raphé—stretches carefully but forcibly the tissues between the penis and anus, grasps the insensitive, undistended and smooth bladder, pressing strongly upward with the two fingers, so that the stone projects as a hard tumor above the symphysis pubis. At this point he makes an incision and extracts the stone. The physician should take pains to avoid splitting or breaking the stone, for a single fragment left behind, even though it be small, grows up anew. Therefore the physician should draw out the entire stone with the forceps."

In operative midwifery, also, the Indians displayed important knowledge. Besides Cæsarean section upon women who die in the latest period of pregnancy, cephalic and podalic version, embryotomy, embryulcia, craniotomy etc. were performed.

"When the child cannot be brought forth, the physician may employ the knife in such a way that he by no possibility cuts a living child with it: for if the child is injured, the physician may destroy both mother and child together. Having cheered up the woman, he then grasps in his hand a sickle-shaped knife, cuts in pieces the head of the (dead) child, drags down the cranial bones, seizes with a hook the breast or shoulder of the child, and draws it out by the cut head, the eye or the chin. If the shoulder is near, he cuts off the arm close up, makes an incision into the abdomen, distended like a bellows or filled with air, extracts the intestines, and draws out the now pliant child, or drags down the hip bones. Whatever limb, however, the physician seizes must be cut off and drawn out, and he must preserve the woman carefully from injury."

The history of generation and of development, ordinary midwifery and gynæcology, likewise enjoyed the attention of the Indians. The time of menstruation was remarkably beautifully and poetically (as the subject deserves), pointed out as the period best suited for conception,

"For then the mouth of the womb is open, like the flower of the water-lily to the beams of the sun;"

probably because the Indians assumed that the embryo originated from the union of the "delicate" male semen and the "fiery" menstrual blood. If the former predominated a male was produced; if the latter, a female; if, however, both are equal, an androgynous individual was the result. The man attains puberty at the age of 25 years, the woman at 12. After conception is accomplished the embryo fixes itself in the first month; in the second, it becomes oval or spherical: in the third, the head and extremities begin to manifest themselves; in the fifth, the outlines of the trunk and head are visible and the intellect develops; in the sixth and seventh, these become more evident; in the eighth, the child becomes restless; in the ninth, tenth, eleventh or twelfth, it is born. Before birth, however, the child turns itself over (*culbute*), i. e.

> "The child, who sat with the head erect, the mouth directed toward the spine, praying therewith to God, and beholding the heaven, the earth, and the regions beneath,"

inverts itself, so that the head now lies beneath, a doctrine which recently, as the result of investigations upon the changes of position of the fœtus during pregnancy, has received confirmation and acceptance, although of a more limited and precise character. Regular accouchement requires the aid of four stout women only. If, however, the position of the child is faulty (in which are included footling, back, breech, side and breast presentations, as well as presentations of the arms, head, hands and feet together), it must be either improved by the physician, or the labor must be terminated artificially. The same must be done in the case of an unusually large head, in contracted pelvis, or in false positions incapable of correction. The sexual life and sphere of woman, in conditions of both health and disease, among the Indians, as among all other oriental people, are subjects of earnest study.

Their special pathology includes among internal diseases, rheumatism, gout, hæmorrhoids, inflammations, fever, catarrh, diabetes mellitus (first mentioned among the Greeks by Demetrius of Apamea), diarrhœa, jaundice, cough, verminous diseases, epilepsy, mania a potu, the exanthemata, dysentery, phthisis etc.

Diagnosis is effected by the aid of the senses and by examination of the sick, and the physician was expected to pay especial attention to the pulse, the bodily temperature, the color of the skin, the urine and fæces, the eyes, the strength of the voice, and the noise of the respiration (!).

The symptomatology of the Indians is very complete, though the oriental descriptions sound strange, and the forms of disease have no analogues with us. "Disease of the heart" manifests different symptoms according to its origin:

> "If the heart-disease has originated from the air, the heart becomes strained and tossed to and fro, it is agitated, lacerated, rent and shaken. Thirst, heat, warmth, inflammation and cardiac fatigue, arise in bilious heart-disease. Flatulence, despondency, sweating, dryness of the mouth, weight, salivation, disgust for food, stupor, lack of passion, a sweet taste in the mouth, arise when the heart is diseased from mucus. Abdominal colic, expectoration, rigors, pain, eructation, vertigo, disgust for food, redness of the eyes and emaciation may arise when the disease depends upon worms. Vertigo, lassitude, faintness and emaciation are symptoms when this disease originates in worms, but they also appear in patients affected with both worms and mucus."

The therapeutics of the Indians are guided by the curability or incurability of the disease. If the disease belongs to the incurable class the physicians do not take the patient under treatment at all, but advise him plainly, honestly and unselfishly,

"To go forth upon a narrow foot-path to the invisible north-eastern tongue of land, to live on water and air, until this earthly tabernacle sinks down and his soul is united with God." (Haeser.)

Herodotus similarly relates: "Whosoever among the Indians becomes sick goes out into a desert and lays himself down there. No one troubles himself about him, whether he be sick or dead."[1]

If, however, the disease is curable, attention must be paid in the cure to the disease itself, the season, the organic fire, the age, bodily habit, the strength, the intelligence, — according to the Indian ideas the stupid are cured more quickly than the intelligent, because, thinks the open-hearted Susruta, they are more obedient. — nature, idiosyncrasies, remedies and the regions of the earth. In "disease of the heart" the cure, with all due regard to the above circumstances, is managed somewhat as follows:

"If the heart is diseased through the air, the patient should be first of all anointed, then take an emetic, and thereafter a drink, consisting of numerous ingredients. When now he is regularly "purified", he is given food, consisting of old rice in meat-broth with butter, then an enema, and finally another emetic. If the heart is corrupted by mucus, the patient first of all takes an emetic, then the drink recommended in heart-disease depending upon air, next antidysenteric food, or a purgative; finally—the physician skilful in the administration of enemata, gives him an enema of oil and Pavonia odorata."[2]

The Materia Medica of the Indians is most copious, in fact almost as rich as ours of to-day. It embraces remedies from the animal, vegetable and mineral kingdoms, together with the arts of magic. Remedies are used both externally and internally; they are divided into pharmaco-dynamic classes, and are either simple, or (as is more frequently the case) exceedingly complex in their nature. Venesection and cupping, especially the former, play an important part, as well as means for exciting and strengthening the desires and delights of love in both the feeble and the strong —a genuine oriental specialty. Even inhalations into the mouth and nose by the aid of tubes are known. The ancient Indians had hospitals. Inoculation of the natural and artificial virus of small-pox was practised in a prophylactic view. The Brahmans always performed this operation in the beginning of the warm season. The skin was rubbed, a few incisions made, and virus of the preceding year, with which pledgets of cloth had been saturated, was bound upon the abraded surface. The persons thus inoculated were compelled to remain in the open air (Indian method of inoculation). Boys were inoculated upon the outside of the forearm, girls upon the upper arm. Vaccination is now obligatory in the larger cities, but elsewhere the old plan is generally carried out.

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[1] Even at the present day persons hopelessly ill, or supposed to be in a hopeless condition, are carried to the banks of the Ganges, where their relatives fill the mouth and nose of the invalid with the sacred mud of this stream, and then abandon him to the waters. If the persons thus exposed chance to recover, they are no longer acknowledged by their relatives, but are regarded as dead. They are then compelled to take refuge in the "Villages of the dead men" (found in the vicinity of large cities), and there to prolong a wretched life. (Prof. Ed. Hildebrandt, "Reise um die Erde", 6 ed., Berlin, 1879).

[2] Such "Indian cures" frequently enough with us also attract the common people, and from their manifest activity procure a thriving business.

The "Pavonia odorata" is an Indian plant of the order of Malvaceæ. (H.)

Dietetics are carried to the extreme, and carefully regulated. The Indians are forbidden to eat meat.

Their knowledge of toxicology is considerable. Such an acquaintance too with natural history as is necessary to a knowledge of remedial agents, is possessed by the Indians in a remarkable degree. On the other hand, anatomy forms the weakest side of Indian medicine.

This, however, ought not to occasion much surprise when we consider the prohibition of contact with the dead—an offence always to be expiated, though only lightly. The method of preparing bodies and the sole instruments employed in this process are very original, but certainly not adapted to afford a good insight into the structure of the human body.

> "Let the physician leave a corpse fastened, together with its receptacle, in a brook, to macerate in a clear place,—a corpse which has a body uninjured, uncorrupted by poison, unshaken by chronic disease, unhandled a hundred times, unclothed,—and draw it out when maceration is completed. The corpse at the expiration of seven days should then be rubbed with pieces of bark; he can then with his eyes see the skin and all the external and internal parts."

These pieces of bark[1] form the entire dissecting case of the Indians. From such methods of preparation, singular views in regard to anatomy ought not to surprise us. Accordingly the human body consists of six members (the four extremities, the trunk and head), and has 7 membranes, 7 segments, 70 vessels, 500 muscles, 900 sinews, 300 bones, 212 joints, but only 24 nerves, and 9 organs of sense, etc. The vessels contain not only blood, but they carry also bile, mucus and air about through the body. Of the nerves, which take their origin from the navel, 10 ascend, 10 descend and 4 run transversely. As soon as the 10 ascending nerves reach the heart, however, they divide into 30.

The physiology of the Indians supplies something more than such fanciful theories. They distinguish excretion and digestion, chyme and chyle, from the latter of which the blood, after birth, originates. The natural heat is regulated by the nerves, which also control the motion of the breath, urine, blood, semen, and menstrual-blood in their several channels. They assume the existence of a vital force which, it is true, is recognized by its effects only, but which animates all portions of the body etc.

To sum up our judgment of Indian medicine, we must assign to it, at all events, a superiority over the Egyptian and the Jewish; indeed, it may claim even the very first rank among those examples of medical culture which have not experienced a continuous development. That it was not far behind Greek medicine, both in the extent of its doctrines and in its internal elaboration, furnishes us only a very superficial comparison.[1] It cannot fail to extort our admiration when we consider the very early period in which it developed and attained so high a grade, and when we take into account also the people who accomplished so great a work. Yet we can never measure it by our standard of to-day. Such a course would be as false as unhistorical.

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[1] Wise says a brush made of reeds, hair, or bamboo-bark. (H.)

V. THE MEDICINE OF THE CHINESE AND JAPANESE.

If we may consider it a characteristic of the ancient, as well as modern Indo-Germanic peoples, that they have all developed after the type of the organic kingdom, in other words, that their civilization has sprung up, developed, bloomed, decayed, and finally perished (sometimes together with the people itself); on the other hand, the Mongolian races have followed the type of the inorganic kingdom. They and their civilization, like mountains, having attained a certain limited height, have existed there, inflexible and almost unchanged, for thousands of years. Thus they are more enduring, and defy longer time and destruction, so that up to the present time the dictum that to stand still is to die, seems in their case to lack verification. Their very inflexibility preserves them from the diseases of development, and from ultimate destruction. The germ of their civilization and their forms remain unchanged. This, however, has been possible only from the fact that they have, up to the present time, been able to preserve themselves from intellectual, and, if possible still more strictly, from physical intermixture with foreign races.[2]

The people of Kong-fu-tse (died B. C. 479), the Chinese, quick-witted indeed and fanciful, but wanting in art, in the higher sense of that term, are commonly regarded as the type of the Mongolian race. Their literature is apparently immense, though but little of it is known to the outside world.[1] Judges of it, like Von der Gabelentz, affirm, however, that it demonstrates the activity of the general law of development, even among the Mongolians, though the course of this development may be slower than among the Indo-Germanic peoples.

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[1] A transfer of Greek medicine to India is still assumed, so that the originality of Indian medicine would be doubtful. In support of this assumed transmission are adduced the facts that, even in antiquity, intercourse with farther Asia occurred (Solomon, Megasthenes, Alexander the Great, etc.), and that active commercial associations existed even in Roman times. A number of gold darics, found near Benares some few years ago, furnish positive evidence of such intercourse. Pliny, however, asserts that more than twenty millions of dollars in gold and silver flowed into India annually in the way of barter. (Max Müller.)

Actual transmission of scientific information from Greece to India on the subject of astronomy can be proven, according to Müller. Aryabhata (A. D. 476) taught the revolution of the earth upon its axis, and explained the origin of solar and lunar eclipses; indeed actual Greek names are found in the poet Kâlidâsa, whose poetry displays evidences of Grecian influence. Hence Muller speaks of the "Indian era of the renaissance".

[2] The recent discovery of Roman imperial coins in the vicinity of Canton, is satisfactory evidence of commercial intercourse between the ancient Romans and the Chinese.

That the Chinese possess an ancient civilization, entirely characteristic, and in its way even highly developed, is well known. While, however, they themselves place the beginning of their political life many thousand years before the Christian era, it is certain that their reliable history reaches back no farther than a few centuries before Christ. They, however, ascribe to the emperor Huang-ti (B. C. 2637) a treatise on medicine still extant, and entitled Nuy-kin (Neiszin, Heidsin), probably a forgery of the beginning of our era. In like manner they ascribe to the emperor Chin-nong (B. C. 2699) a kind of pharmacopœia or catalogue of the herbs of the celestial kingdom, and they further relate that Tsching-wang, the second emperor of the Tsin dynasty (founded by Tschwang-siang-wang, the builder of the Chinese wall, B. C. 248), authorized the destruction of all books, except those treating of agriculture and medicine, in order to abolish every tradition of custom and law. The whole story, however, is very untrustworthy.

The ancient and unlimited liberty of choosing one's occupation in China, which contrasts so strongly with our own custom, has resulted in making the medical profession perfectly enormous. From the earliest times, therefore, there have been found several physicians in every village, as has recently become the case with us. In China any person may be a physician to the poor and the faithful (that is to the masses abandoned to every impostor), without having given any previous evidence of his professional competency. Anyone, too, may assume the title of physician.

Recently, however, the Chinese government has had its eye upon the physicians. "The doctors", so runs an edict of 1882, "have the bad habit of not visiting their patients before one o'clock in the afternoon. Some of them even smoke opium and drink tea" (we should say spirits) "until late in the evening. These are abuses, which the government will under no circumstances permit. Doctors must visit their patients at all times; if necessary, they must visit them several times a day. They must think more about them, and less about their fees. The public and all officials are notified that a physician, who does not come at once when called, can claim only the half of his fee and his expenses. If you physicians put off your calls, you manifest your godlessness and sin against yourselves." ("Unsere Zeit".)

The court-physicians only, as a matter of precaution, are compelled to pass an examination before a college at Pekin. Physicians belonging to old (medical) families are held in special esteem. There are also in China special dentists, oculists and minor surgeons (Vay-ko), whose residences are distinguished by firm-names and signs as with us; only the practical Chinese, among whom newspaper advertising is as yet not greatly developed, add thereto the grateful certificates of their convalescent patients and similar matters,[1] as charlatanical recommendations—a custom which has not, at least as yet, come into vogue with us.

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[1] According to Kwotse Kien, Pekin possesses an immense library, founded in the 12–13th century. Every city has its state-library under the administration of mandarins. Besides these there are private and circulating libraries, the latter of which, in contrast with our similar institutions, are patronized only by the lowest classes, and chiefly by women and girls. Chinese ghost-stories and love-tales, romances, plays etc. form the literary provender of the patrons of the circulating libraries even in China.

> As regards business signs, it is said: "From the number of bright-colored pictures we have to deal with a man of consideration. On one side of his doorway we read: 'Twai IV., great grandson of Twai I., of Ningpo, whose specialty is the treatment of fractures and dislocations.' The other side shows us the worthy man himself, as, with three fingers and an air of importance, he feels the pulse of a patient. Beneath are the words: 'Excellent ability inherited from his ancestors', a notification which rarely fails of its effect upon the Chinese."

In China, however, as in certain parts of Switzerland, physicians are also in some degree apothecaries. The visits to, and examinations of the wealthy, which often last for hours — though in the case of the poor they are superficial enough, — are very reasonable in price (about 25 cents), and the prescriptions furnished are remarkably large and long. The Chinese have no public hospitals, for everyone, even the extremely poor, would consider it a great disgrace according to Chinese customs, if he did not himself take care of his sick dependants or relatives. Piety towards the deceased members of one's family is so great that, even in the notices of death, the remedies employed in the special case are given, in order to guard against reproach. The Chinese, from their conservative disposition, employ their own physicians even in foreign countries, e. g. in America, where, however, these physicians are cunning enough to provide themselves with the title of doctor and a white clientèle.

> "The Chinese are even greater fatalists than the Turks. Hence they always prefer to cover all possible parts of the body with green plaster, and to swallow down mighty mixtures, fearfully and wonderfully brewed, which for ever so many hundred years have been mentioned as infallible remedies. It is only in dangerous cases that they call upon their quack-doctors, of whose cures they boast, without ever blaming them for their failures (a habit which would be very agreeable among us!), which the will of the gods has always determined. As soon, however, as a foreign physician appears at the bedside they forget that medicine is an uncertain science, and expect certain success. On the whole the Chinese despise our science."

Chinese apothecaries, before they can carry on their business, must have passed an examination, and must exhibit a diploma from the examining board. Powerful remedies, like opium, arsenic etc. are forbidden to be dispensed by them without the prescription of a physician. The pharmacies are fully supplied with the necessary drugs (a Chinese pharmacopœia contains 650 different kinds of leaves), and they are kept in a very orderly condition. Besides pills as large as musket-balls, their proprietors also prepare love-potions etc.

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[1] Many physicians nail up on the front of their houses the plasters used by their patients and then returned to the physician, and this process is continued until finally the whole house is covered. They also wear large spectacles, made of window-glass, to convey the impression that they are savants.

The pharmacies also have curious kinds of signs, e. g. a row of lanterns over the entrance, adorned on all sides with figures, flowers and characters, while from within comes a powerful odor. Over the door is the name of the pharmacy, "The Double-headed Eagle", and within are found tablets with notices like the following: "All medicines from every province of the kingdom for sale"; "Powders carefully mixed" etc. The prescriptions of physicians are prepared by the apothecary, as with us, but the latter combines also with his business the occupation of fortune-telling.

Medical study consists in mechanically learning by heart the old Chinese medical works, and, where possible, the inherited knowledge of remedies, all in accordance with the genuine Chinese maxim: "The older the better."

Chinese surgery (Wae-ka) embraces the practice of acupuncture (our Baunscheidtism), which is regarded as a universal remedy, and has for its object the quickening of the "vital spirits." It is practised by twisting or driving in a needle inserted into the body, and in the first case is called Nedschibari, in the last, Udschibari. By this operation a free passage is supposed to be made for the "winds". Besides this, Chinese surgery includes the application of moxas, cupping, inoculation (a crust upon cotton in the nose!), which the physician Go-mei-schan is said to have invented about A. D. 1000, paracentesis of the eye and bleeding. The latter operation is, however, practised rarely, and is performed with a potsherd or small lancet, after which tallow and oil are applied to the wound without any bandage. Enemata are not employed, since they are offensive to the modesty of the dignified Chinese. Under ordinary circumstances, they make shift with poultices — in this line cats' liver and fowls' entrails are specially popular, — while fractures are treated by extension. Kneading of the muscles (Massage), which is also said to have been in use 2000 years before Christ (though, according to Wernich, of Japanese origin), is likewise practised. The Chinese also claim to have been able for thousands of years to produce anæsthesia by means of the preparation Mago. Inoculation of modified small-pox too has recently been practised by them. Their surgeons are extremely ignorant, are assigned to inferior service and receive little pay, so that their shops are poor. Castration is practised by members of the guild of surgeons. The thighs and hypogastrium are first bandaged to prevent excessive hæmorrhage, after which the penis and scrotum are cut off close up to the body! The instrumental apparatus of Chinese surgeons is very incomplete (as is manifest from their practice in bleeding), so that e. g. in the extraction of teeth they employ ordinary forceps.

Practical midwifery is in the hands of old women, and is nowhere managed by physicians. At best we find only a kind of midwives, who study the position of the child according to plates in the books for midwives, and make use of a great number of superstitious manipulations, amulets, delivery-stockings etc. The physicians, on the other hand, busy themselves with prescribing remedies, which are supposed to improve even the position of the child in the womb, though they know nothing of either the uterus or its functions. Hence we can say nothing of an obstetric art in China.

Military hygiene is totally unknown. Neither in the army nor in the marine service are there any military physicians.

The pathology (Shang-han) of the Chinese is very incomplete. All diseases, especially epidemic diseases, are ascribed to spirits and winds, cold and warm humors etc., and are assigned, in accordance with their benign or malign character, to Yo (the good principle), or Yn (the evil principle). To Yo belongs e. g. acute inflammatory fever, to Yn, hectic fever, etc. There are, according to Chinese pathology, 10,000 varieties of fevers. Among their diagnostic procedures are examination of the tongue and the eyes, and feeling of the pulse. The pulse flows from the "spirits" of a certain part of the body, which manifest their presence in a given place. By means of it both the cause and the seat of disease are to be found.

The art of feeling the pulse is very old and extremely elaborate. It is performed elegantly, by placing several fingers upon a certain point, and then raising or depressing each in turn, as is done in playing the piano—the Chinese "play upon" the pulse where we simply feel it. In this practice the changes of the moon and the season of the year are considered, according to certain rules. The performance often lasts several hours, sometimes on the "heavenly spot" (the upper part of the carotid artery), or on the "earthly spot" (the tibalis posticus near the ankle), or on the "human spot" (the radial artery at the wrist)—the latter must be felt with the three fingers mentioned below!—sometimes on the right arm, sometimes on the left, now higher up, now lower down, now on one side only, again on both sides, one after the other etc. Three fingers particularly were employed: Dzun (the index-finger, indicating the spirits of the liver), Quoan (the middle finger, indicating the spleen), and Shaku (the little finger, indicating the heart). In diseases of the heart e. g. the left pulse is investigated; in those of the liver, the right etc. Each speck upon the tongue and every discoloration of this organ points to special diseases and viscera. Thus a red tongue indicates warmth of the heart—and the south; a white tongue, the lungs—and the west, etc.—absurdities for which analogues might have been found, not long since even in civilized Europe.

Chinese pharmacology (the work of Lee-Shee-Tshin, consists of 40 octavo volumes), contains remedies from the vegetable and animal kingdoms almost exclusively, and is very copious. It includes elephant's bile, dried spiders, bugs, toads, lizards, snakes, claws, ears, tongues, hearts and livers of numerous animals, excrements, dragon-bone, cotton, ivory, musk, rhubarb,[1] gentian, camphor,[2] Chinese seeds, leaves in large doses, and

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1. Rhubarb is mentioned in an herbal, entitled Pen-king, and ascribed to the emperor Chin-nong (B. C. 2737–2697). Cassia is also here noticed under the title Kwei. (H.)

2. The camphor-tree was known to the Chinese as early as the 6th century, but the first notice of the preparation of the gum from the wood is probably to be found in the herbal Pun-tsaou-kang-muh, written by Le-she-chin, near the middle of the 16th century. The Sumatra camphor, however, is prescribed by Aetius (A.D. 550), though as a considerable rarity. (H.)

innumerable other things. The genuine ginseng-root (worth about $25 an ounce), and the edible nests of the swallow (Collocalia esculenta) are considered veritable panaceas, and are specially prized by the Chinese as aphrodisiacs (the mediæval monks used similar stimulants).

In therapeutics too great importance is laid upon strict diet, frequent baths etc. The chief task of the physician, after making his diagnosis, is to remove the materia morbi, which has entered by way of digestion, the nerves, or the circulation. In general the maxim contraria contrariis is followed: hence in debility e. g. the extract of tiger's blood is prescribed. Almost every animal supplies a distinct specific, particularly its blood and its liver. Then of course exorcism by physicians (in epidemics with dragon-banners in front, burning scraps of colored paper inscribed with formulæ of incantation, fire-crackers etc.), and similar superstitious observances are not wanting. Often too, especially among the wealthy, the whole store of Chinese remedies must be exhibited, until the proper specific is found, and the patient either restored to health, or cured — to death. In the latter event the patient, according to the Chinese idea, is indeed cured by the suitable remedy, but the physician has not had the time to rid him of his poisonous drug, and, as the result of this unfortunate want of time, the patient is doomed to die. (Wernich.)

Anatomy and physiology occupy the lowest grade in Chinese medical science, though a few very old and imperfect plates are in existence, and European anatomical works have been translated, e. g. that of Pierre Dionis.[1] In their veneration of the dead dissection of the human body is of course excluded. The Chinese assume six chief organs in which the "moisture" is located, viz. the heart, liver, two kidneys, spleen and lungs; six others in which is the seat of "warmth," viz. the small and large intestine, the gall-bladder, the stomach and the urinary apparatus. They enumerate 365 bones, including 8 for the male, 6 for the female cranium; 12 ribs in men, 14 in women. The Chinese, in place of the fire and earth of the Greeks, class wood and metal as elements, and heat and moisture (whose union produces life, their separation death) are regarded as fundamental qualities. With death everything is ended, for the Chinese, and the doctrines of Cong-fu-tse recognize no immortality. The qualities, however, wander from time to time, and therefore the physician must know the six springs of life — very incomprehensible things for us of the present day, though something more than a hundred years ago they were also heard of among us! The circulation flows outward from the lungs five times in twenty-four hours, and terminates in the liver. The bile, as it is one of the most powerful remedies, so also is it the special seat of courage (the Chinese are courageous only when in passion); the lungs give origin to the voice; the spleen is the seat of reason and, with the heart, furnishes ideas; the liver is the granary of the soul, while the stomach is the resting-place of the — mind etc.

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[1] "L'anatomie de l'homme, suivant la circulation du sang et les dernières découvertes", Paris 1690. It was translated into Chinese by Père Parrenin, a Jesuit missionary, early in the 18th century, at the request of Cam-Hi, the reigning emperor (died 1723). (H.)

The "Instructions for Coroners" contain a kind of legal medicine, which enumerates innumerable nonsensical signs, supposed to remain valid long after death. The bones of parents may be identified by the child, if the latter inflicts upon himself a wound with a knife and allows the blood to fall upon the suspected bones. If the latter absorb the blood, they belong to the parents; if not, they are the bones of a stranger. The important point is that in this way a criminal is always discovered — a result easily attained by this or any other procedure — among the Chinese! (L. Katscher.)

The Chinese in their extremely comprehensive literature possess numerous medical works of widely different periods. Among these are the Ching-che-chun-ching (Approved Guide to Medical Practice), in forty volumes, a treatise on pharmacology entitled Pen-zao-gan-mu, both voluminous compilations and encyclopædias — compendious, but good books, impress the Chinese no more than they do us,— works entitled Zsin-io-zschuan-schu, Benzao-gan-mu, as well as translations of European (particularly French) works.

The reader will discover that very much of Chinese medicine has the appearance of either a caricature or a satire of our own.

[Even Chinese exclusiveness, however, has been compelled to yield something to the influence of Western science. In 1868 the Chinese government established a university at Pekin, to which European and American professors were called. All the foreign settlements and missionary stations, of course, contain resident European or American physicians, and in some of the larger cities these representatives of Western medicine are men of excellent ability and considerable experience. To these the better educated and more wealthy of the Chinese not uncommonly apply for medical advice, especially after the failure of the efforts of the native practitioners. In 1880 Li Hung Chang, viceroy of Pi-Chi-Li, at the instance of Dr. Mackenzie, an English physician attached to the London Mission, opened a hospital for the natives in Tien Tsin, the port of Pekin. This hospital contains 40 "beds", with a dispensary, waiting, operating and lecture rooms, and is under the direction of Dr. Mackenzie. The nature of the so-called beds will be best understood from the following description given by a correspondent of the Philadelphia Medical News:

"They are constructed of large bricks, set in mortar, having a fire-place beneath each, in which straw, hay and brush are burned for heating the whole. Thus each patient has his own fire, by which all his food is cooked in utensils furnished by himself. Now when a Chinaman takes to one of these beds, which might with propriety be termed a brick oven, he immediately proceeds to divest himself of all clothing down to the skin; nothing remaining on the body save, it may be, a piece of cloth about the loins. He then places himself between two thick, coarse, plank-like quilts, with his neck upon a wooden pillow. This is the Chinese fashion of preparing for and going to bed, and although it has drawbacks, yet it allows certainly of free inspection of the individual at a moment's notice.

With the co-operation of the same Li Hung Chang, Dr. Howard, a female physician and graduate of the Medical College at Ann Harbor, Michigan, has organized in a temple at Tien Tsin a dispensary for females, who by Chinese custom are absolutely denied all medical aid from male practitioners. Many of the missionary stations have hospitals and dispensaries attached to their other institutions. Thus the Methodist mission at Soochow has a hospital and dispensary, and organized in 1883 a medical school, which in 1884 had eleven native students. The lectures are delivered in Chinese, and text-books are also furnished in the native tongue. The curriculum comprises a course of instruction of five years' duration. In the hospital and attached dispensary nearly 12,000 patients were treated in 1884.] (H.)

JAPANESE MEDICINE.

The imaginative, busy Japanese, the "French of the East", more disposed to art than the Chinese, and fond of novelty, are a mixture of the aboriginal Aïnos (now almost extinct) and the conquering Malays, whose blood at present predominates. (According to Baeltz, however, the Japanese are pure Mongols.)

They have advanced in independent medicine no further than the Chinese, from whom (according to Gierke) they adopted their medical knowledge about the fourth or fifth century of our era. Recently, however, they have endeavored to push forward, partly by calling European physicians to the medical schools of their own country, partly by sending their young men to be educated as physicians in foreign universities, especially those of North America and Germany (e. g. Munich, Berlin).[1]

Medical schools, after the model of those of Europe and America, exist in Nagasaki, Osaka, Kangoschina, Sanga, Hakadot and Nadegoja. A most complete academy or university on the German model, and in which even the German language is employed in teaching, was erected at Yeddo, in 1871. Here, however, the instruction is given more as in our Gymnasia, and is divided into several grades. The text-books are European works translated into Japanese. Even a medical journal appears regularly, edited by an Englishman, and bears the title Kin-se-i-Selzu, or "Medical News".[2]

The Japanese, especially the wealthy among them, worship, as the god of health, good cheer and fruitfulness in women, Hotëi, a fat, jolly god — plumpness is considered a sign of happiness and comfort — whose belly as he sits overhangs his short legs, and who seems, therefore, to have a good practice and to be a good celestial colleague. On the other hand, Abutto, who belongs to the gods of the second class, is invoked by the poor and by mariners, who now and then cast into the water a small coin as a fee. To test whether or not their prayer has been heard by the god, they throw spitballs of amulet paper against his image; if these stick fast it is a good sign, but if they fall to the ground the prayer remains unheard! Shion-ro or Giogin is the god of long life. To rid themselves of infectious diseases the Japanese celebrate the feast Kusurikari, on the fifth of May, when herbs are gathered with superstitious observances. Jammabos or conjurors cure diseases by providing themselves with a description of them, laying this before an idol, twisting the paper into pills, and finally giving these pills to the sick.

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[1] No less than 500 students were sent to the United States, among them the brother of the Mikado, who became a student in the U. S. Naval Academy at Annapolis. Among these students were five ladies, the first of their sex to leave Japan for educational purposes. Harvard University received a number of the Japanese students, and others attended various other eastern colleges. (H.)

[2] In 1884 about a dozen medical journals were published in Japan, all of which were said to receive a fair support. (H.)

In the pathology of the ancient Japanese medicine, external and internal diseases are said to be distinguished. A disease peculiar to the Japanese pathology is the lesion of the spine, called Kakkeh. The most wonderful things are regarded as therapeutic measures; e. g. in small-pox the decoration of the sick-room with red hangings.[1]

The general prevalence of prostitution in Japan (under which head we must not, however, class the peculiar Japanese temporary marriages, permitted even to foreigners), renders syphilis of frequent occurrence. In its treatment the native practitioners employed superstitious remedies, but mercury also. According to Brunner, a favorite domestic remedy for gonorrhœa was three times three hairs from the mons Veneris of a woman, and sulphur baths from the famous mountain Fusi-Yama (the Japanese Aix la Chapelle) were employed as the last resort in syphilis. That the venereal disease was introduced into Japan by the early European missionaries, as has been stated, is quite possible, for venereal disease and the priesthood neither exclude nor imply each other.[2]

The Japanese apply moxas (according to Wernich a Japanese invention, prophylactic in design), and the body of every native bears the cicatrices of these applications. Acupuncture is also practised, and the acquisition of this art formed the key-stone of ancient medical education (prior to 1820). They are acquainted with numerous medicaments, partly native, partly adopted from the Chinese, and indeed they have plates of remedial herbs.[3] Besides moxas and acupuncture, warm baths (in which the tub once filled suffices for the whole family) may serve for an example of their hygienic measures. The Japanese have been acquainted with cremation

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1. It is curious to note that this identical plan of treatment in the small-pox was practised by the famous John Gaddesden on the son of king Edward II. early in the 14th century. Gaddesden was professor of medicine in Merton College, Oxford, and the first native court-physician of England, but nevertheless, as Watson says, "a very sad knave". (H.)

2. A Japanese medical work of the Dai-do period (806–810 A. D.), and entitled "Dai-do-ru-shiu-ho", is said to mention syphilitic chancre, bubo, ulceration of the throat, and affections of the skin, joints and bones. (H.)

3. Our modern extract of malt, under the name "midzu ame", has been employed in Japan for centuries. (H.)

since the 6th century, and they also perform vaccination with cow-pox, a practice introduced into Japan by Phil. von Siebold, between 1820 and 1830.

The Japanese have also a real art of midwifery of considerable elaboration, and exercised by men. They practice in accordance with the precepts of the famous obstetrician Kagawa-gen-ets, who in the year 1795 published his book on this subject entitled San rong (Description of Labor).[1] In this work are discussed the development of the fœtus, the theory and practice of pregnancy, the selection of the lying-in apartment, the position during labor—Japanese women bear children upon the knee—the management of labor, the use of labor-stools and the abdominal bandage, a cap for the extraction of the fœtus, fillets for extraction and turning (Wernich), and finally version by external manipulation.

In the artificial induction of premature labor, a certain root is inserted between the uterus and the membranes, and left in position for one or two days; or silk threads, dipped in a solution of musk, are introduced into the os uteri during the fourth or fifth month. Artificial abortion is indeed prohibited by law, and besides this is regarded as a sin by the women of the higher classes, but it is frequent, in fact customary, among women pregnant by a temporary marriage, and among those of the lower class. In the latter it is performed by ignorant women, just as among servant-girls with us. In the temporary marriages the question is asked whether children are desired or not, and the orders received on this subject are scrupulously executed by the female contractors (tampon?). Obstetricians were not required to pass any examination, and learned their art practically from observation of their teachers.

On the whole, the medicine of the Japanese bore almost as strong a theurgic character as that of the Chinese, from whom, as we have already seen, it was adopted. Both too may be considered philosophical sciences, inasmuch as neither was ever a sacerdotal medicine proper.

The relations of the medical profession in Japan, during the period when the influence of foreigners was almost entirely wanting, were quite different from those which have prevailed since this influence has become dominant,—since about 1820, and more strongly since about 1860.

In ancient Japan students studied for two years with a teacher of their own caste. They recited to the latter certain Chinese medical works (which were very rarely explained), learned to prepare medicines, acquired certain manipulations, and finally completed their education by practising acupuncture for about two days. The higher physicians belonged to the "Long-sleeves," i. e. the learned, and as such had their heads shaved, except in the capital, where the influence of Buddhism was not felt. Here they wore their hair in a cue, twisted upon the crown of the head. Ordinary physicians sprung from the lower caste, composed of artisans, merchants and peasants, or were the sons of physicians. The latter was more fre-

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1. Ten years later, Kagawa's adopted son and assistant published some commentaries on the San rong, entitled San rong yoku (H.)

quently the case. In the former case the medical men by their transfer among the Long-sleeves enjoyed an elevation of rank, that is they were allowed to wear *one* sword.[1] The physician's honorarium consisted of so-called "presents" — in 1862 the ordinance provided about three cents! — which were, indeed, ordinarily given, but could not be sued for. By cringing and flattery the physicians endeavored to increase these honoraria. The earlier physicians of Japan, like those of China, had advertising signs, but the Japanese had depicted upon their signs actual cases of disease, even syphilitic lesions upon gigantic penes (Hildebrandt). The latter organs were depicted too in the most unconstrained way in other localities, e. g. on the "coffee-houses". Medicines were made a special charge, and when the physician was consulted at his own residence, were alone charged. In villages the physicians were particularly looked up to as "savants". Specialists (obstetricians, venereal doctors, dentists etc.), with the exception of those physicians who performed acupuncture, were less respected than the general physicians, quite in contrast to the custom with us. If a physician of the lower class rendered himself specially famous he might become physician to the prince, which of course happened only exceptionally. These physicians to the prince wore *two* swords, and looked down with infinite scorn upon their inferior colleagues. As a rule they sprung from the Samurai caste, and were considered degraded members of the same: hence they were recruited only from the sons of the Samurai physically unfit for military service. If mentally incompetent they became priests! Only when compelled by necessity did they practise like the popular physicians; as a rule they held position near the princes. They too had special distinctions of rank: the lowest class stood between the foot and mounted Samurais, though nearer to the latter. The superior Daimio-physicians, like the ordinary physicians of the Shiogoon, belonged to the Samurai caste. The real physicians-in-ordinary of the Shiogoon, on the other hand, belonged to the nobility of the empire, possessed small estates and castles and were distinguished by titles. The physicians of the Mikado — about fifty in number, including twenty superior physicians, and one president, to whom all the others were subordinate — possessed the highest rank of all physicians. Many of these higher Daimio-, Shiogoon- and Mikado-physicians were rather companions and entertainers of their lords than medical counsellors, and only a few of them served as physicians-in-ordinary. The Daimio-physicians, if of higher rank, had the right to be borne in a litter, Kango, on the journeys of their master to the court of the Shiogoon, those of lower rank

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1. Even in the last century European physicians, as we know, were permitted, as members of the upper class, to wear a straight sword. The privilege of wearing a sword was again given to the state physicians of Hesse during the present century, though the least of them were thus made members of the "Long-sleeves".

must travel on foot, and a litter was assigned to them only in case of fatigue.[1]

In "New Japan" too all legal regulation of the payment of physicians is wanting; still the old principle continues in vogue:

> "Since men of this world can never be free from diseases, the philosophers of antiquity, full of compassion, have created the healing art. When, therefore, their disciples also cure diseases skilfully and have success, ye ought"—a negative regulation—"to concede to them no great income indeed, for if they were in possession of the same they would necessarily neglect their profession", — a philosophy which seems to have suggested our low tariff of fees,—"but as often as they have performed a cure, ye ought to give them a fee corresponding to the greatness of their success.

The physicians educated in the universities of "New Japan" are said to be about like our old country physicians; the best educated of them, however, stand higher. The physicians of the advanced school "even way back in the country, have provided themselves already with percussion hammers, pleximeters and stethoscopes, and indeed with medical thermometers, which they carry proudly and openly in their belt," as our whole younger generation carry them in their breast-pockets. In 1878 Wernich, to whom we owe all this information, thought that in three years the whole country would be settled with such university pupils. The government sends a medical journal into each district.

Besides the physicians there are also midwives, Sambas, a very ancient class of women, who, according to Wernich's view, supplied the principles for the teachings of Kagawa. Then again, there are practitioners of massage, Ammasau (blind kneaders, likewise blind men), who are practised in the art of muscular kneading. The specialists in acupuncture practise their art, according to minute and numerous rules, on certain places which have names like "Great Ocean" (Kiokai), a point situated one inch below the navel, "Heaven's Axis" (Sensu), an inch on either side of the navel, etc. The acupuncture figures most used are triangular, imperfectly right-angled or right-angled. The operation is regarded merely as a measure of prevention. In 1834 there was also a private ophthalmic clinic in Tokio.

[Some idea of the almost incredible rapidity of the advance of Japan in medical science may be formed, when we state that in 1881 no less than 267 medical works (principally, however, translations) were published in the Japanese language, and that in 1883 some 400 volumes of Japanese medical text-books were sent by the government to the library of the office of the Surgeon General at Washington.

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[1] The medical arrangements of "Old Japan", as described in the text, will probably be better understood if we explain that until 1867 the Mikado was the actual spiritual and the nominal political head of the government, while the Shiogoon or Tycoon was the actual political ruler. The revolution of 1867–68 resulted in the deposition of the Shiogoon and the restoration of the Mikado to his original supremacy in both religion and politics. The daimios were the ancient feudal lords of Japan, owing allegiance to the Shiogoon, but independent in their own sphere, while the Samurai were the military nobility next in rank beneath the daimios. (H.)

Excellent and elaborate health reports (weekly) for the city and province of Nagasaki were also published by the authorities in 1883, and in 1885 a Health Department for Japan was established, under the charge of Dr. Mansanori Agata, professor of hygiene in the university at Tokio, and a former student in Munich, Leipsic and Berlin. The Sei I Kwai, or Society for the Advancement of Medical Science in Japan, consists of 86 members, possesses a museum and a library, and in 1885 published its Transactions in English and Japanese. And all this the work of about twenty years in the extreme Orient!

A German-Japanese medical dictionary, based upon the "Dictionary of German Terms used in Medicine" of our countryman Dr. G. R. Cutter, has just been published in Japan It was compiled by Dr. Shigu, a government medical examiner, and Messrs. Take and Shibatta, officers of the Sanitary Bureau. (H.)]

VI. MEDICAL VIEWS AND ECONOMY AMONG OTHER ANCIENT AND MODERN PEOPLES, WHOSE MEDICAL CULTURE HAS NOT BEEN PROGRESSIVE, INCLUDING WHAT MAY BE CALLED PREHISTORIC MEDICINE.

The people whose medical views are here to be considered belong partly to antiquity, partly to modern times, and to both the old and the new world. But though they differ widely from each other both in chronological order and geographical location, and occupy also very different grades of civilization, they may yet be considered together and from the same point of view, inasmuch as they possess, or did possess, merely the rudiments of medical science, whether original with themselves, or borrowed from another people. Most of them, indeed, occupied the lowest, or what we might even call a prehistoric, grade of medical knowledge and thought. But they cannot be utterly ignored in forming our conception of medicine as a part of civilization in its entirety. This is especially the case with regard to a few, who furnish us valuable information concerning the beginning of the development of medical culture. Others belong here only because they have developed no original medicine of their own, but have adopted the science of some other civilized people.

We begin with the Scythians, whose home lay in the regions to the north of the Black Sea. They came very early into commercial and other relations with the Greeks, who employed them as pedagogues, policemen and, indeed, as slaves, and ascribed to them special knowledge in the art of healing. Their priests Abaris, Anacharsis and Toxaris (the two latter of whom came to Athens in the time of Solon, 639–559 B. C.) are mentioned among others as possessed of skill in medicine.

In their own country, the women were the chief physicians, as they are to-day among the Russian tribes, who now occupy their old homes. Yet they had also male physicians, who probably practised surgery alone. At least upon a vase of electron (a mixture of gold and silver) found in the Crimea, two men are depicted, one of whom is bandaging the leg of a patient *secundum artem*, while the other explores with his finger the mouth of another patient, who screws up his face with pain—a very rare picture of prehistoric medical treatment.

Physicians too of a repulsive type were the Scythian "Enarees" (androgyni), who threw themselves into artificial convulsions and then predicted the result of diseases.[1]

Herodotus relates of the Scythians that they were lusty drinkers, and that Cleomenes learned from them to drink so hard that he became for a time insane (the first example of delirium tremens?): and further, that diseases of the king were ascribed by the soothsayers to false oaths sworn by his name.

Quite similar to the "Enarees" — indeed their successors — are the "Shamans", who still pass for magicians and physicians among the people of Asia from Tartary to Kamtchatka, and who by screaming, drum-beating and furious dancing, work themselves and the spectators into the frame of mind necessary to enable them to carry on their medical impostures.

They pretend to remove diseases by sucking upon the skin and then exhibit, as evidence of their success, the corpora delicti in the form of stones etc.

The Usbeks, a Turkish tribe, besides Shamanism, also embrace Parsee views, ascribing a special curative power in all diseases to the setting sun. (Vambéry.)

The Mongolian tribes, who inhabit middle Asia and embrace Lamaism, when suffering from disease have recourse either to amulets, to the revolution of the praying cylinder (*kurudu*), or to special healing idols. Among their amulets is included the excrement of the Dalai-Lama, which is taken internally in the form of pills!

Among the idols, one called Otschirbani by the Kalmucks is especially distinguished, and for his utility in practice we must feel the greatest respect. From his mouth to his anus runs a canal, through which the priests administer to the sick pills consecrated by this transit, the "unmentionable" of the idol having been first placed upon the mouth of the patient. On the other hand the old men of the Kalmucks call upon the idol Aiuschi to rejuvenate them, since it rests in his power to apportion health, long life and renewal of youth, though he is manufactured of plates of brass.

The natives of Thibet, Burmah, East Turkestan, Tamil-land,[2] Ceylon and Java, for the most part are devoted to the grossest superstition. When e. g. in 1879 a member of the royal family of Burmah died of small-pox, 400 human beings were offered up to the demons. Such medical knowledge as they possess is borrowed from the Indians, some of whose medical works they (as well as the Siamese) have translated from the Sanscrit. The most important medical treatise of the Siamese bears the title "Pathom-Cinda," i. e. "The First Mirror." They distinguish five kinds of blood, enumerate 300 bones and recognize the investing membranes of the liver, the spleen, the brain and the bones, the covering of which looks "like worn-out linen."

Their midwifery is curious and barbarous. "When a woman is taken in labor several female acquaintances and the midwife are summoned. The patient is laid upon her back, and one of the attendants continually presses the belly and uterus alternately downward and backwards, if necessary for four or five hours. If this plan fails, one of the women then treads with her feet upon the abdomen of the patient above the uterus. If this too does not succeed, a bandage is passed beneath the arms of the parturient woman, and she is raised aloft, while several other women hang on to her feet until the child is born and the perinæum ruptured". Such vigorous manipulations occur frequently among rude people, and were even to be met with among us until after the Middle Ages. Recently, however, some improvements in medicine seem to have found entrance into Siam. At least the king of this country, in an address to Ex-President Grant in 1879, emphasized the fact that the Americans, besides other sciences, had brought his people improved medical knowledge and books.

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[1] Further information with regard to these unfortunate beings may be found in Herodotus (I. c. 105; IV c. 67), and in Hippocrates "De ære, locis et aquis". (H.)

[2] I. e. Southern India, especially the Carnatic, where the Tamil language is spoken. (H.)

The inhabitants of Borneo, Sumatra, Celebes, the Moluccas, Sumbawa, Bali, Timor etc. seek their physicians among wandering magicians and serpent-charmers, who by incantations banish the evil spirits, the bearers of disease.

Circumcision is practised by many of the Islanders, chiefly in boys, though also in grown persons, with the object of facilitating sexual intercourse.

Of modern Persian medicine it is to be said that it is adopted in a corrupted form from the old Arabian, and is strongly mixed with superstition. European court-physicians sojourning temporarily in Persia have not been able to improve it much.

Still Jac. Ed. Polak, ordinary physician of the Shah, and a teacher in the medical school in Teheran, educated, apparently, some able pupils, e. g. Mirza Abdul Ali, who presented to Europe in 1877 a report on the plague. Polak, before chloroforming a patient for operation, was always compelled to see that his horse was ready saddled, so that in case his patient died under chloroform he might be able to leave the kingdom at once. The natives looked upon chloroformization as a kind of witchcraft!

In the apothecary shops a pharmacopœa compiled in 1681 by a certain "Father", and containing over 1000 formulæ of Greek, Arabic and Persian origin, is the chief authority.[1]

The drugs are still divided into "hot" and "cold". The "hot", e. g. cinchona, wine, aromatics etc., are administered in "cold" diseases; the "cold", like bloodletting and purgatives, are employed in "hot". One drug is administered after another until one is found which is effective, so, of course, the purest empiricism prevails. Calomel is very popular.[2] Surgery scarcely exists. Midwives are unknown, their place being filled by old women. Labor takes place in the sitting posture. If a person of rank is sick, the native physicians are sent to him by his superiors and subordinates, and these, after consultation, submit their views to the patient himself, in order that he may decide upon the method of treatment which seems to him the best. If, however, he is unable to come to any conclusion, the priests decide for him on the principles of the Koran.

The Turks also have no independent medicine, but even to-day, follow, like the other Orientals, in study and practice the ancient Arabians, beyond whose ideas they are not able to make any independent advance. A full-blood Turk, especially if he belongs to the "better" classes, scorns medicine, and, like the Roman patricians, considers even the study of it beneath his dignity. Even the physicians who have been educated in European universities, or in institutions of instruction erected and conducted by foreign physicians upon Turkish soil, lapse into the prejudices imbibed in youth, as soon as they are withdrawn from the influence of these schools, which are constructed upon the French model. Medical matters, however, especially public and military medicine, are managed (at least on paper) comparatively well, and chiefly in the French style.

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[1] The "Pharmacopœia Persica" of Ange de la Brosse ("Père Ange"), a Carmelite friar, who traveled as a missionary in Persia 1664–1678. (H.)

[2] In this pharmacopœia wine, alcohol, blood, urine, fæces, the dog, the hog, and Kafir (Christ) are classified as "unclean". Thus Christ is branded with Persian abhorrence, even in a pharmacopœia!

The Turkish Academy of Sciences with its 40 Immortals, which was opened in 1870, has held one session!

The tolerably numerous and excellent European physicians who have immigrated into Turkey, and whom the Turk, unless utterly given over to the Kismet, receives gladly, have attained no controlling influence in medicine. On the other hand, in their ordinary private practice they have always, though by no means everywhere, broken through the barriers erected by the Koran, so that they venture to practise even midwifery and gynæcology.

These branches, even in the capital, are to a considerable extent in the hands of ignorant old women,[1] so-called "midwives", before whom a simple delivery-stool is borne as a sign of their occupation. (Seligmann.) In the smaller cities the employment of these midwives becomes the rule, to which in country districts there are no exceptions.

There is, indeed, a special medical school, or rather a university, in Gülhané, a "Société Impériale de Médecine" etc. in Constantinople, and likewise a medical journalism in the Turkish language. The latter is often tiresome enough, as is loses itself in the stupidities of ancient Turkeydom. Even in the larger cities, and especially in Constantinople, the situation of practical medicine is far from good, in consequence of the over-supply of physicians, not a few of whom are without any fundamental education. The varieties of treatment practised by physicians of different nationalities and their bad, i. e. doubtful, compensation, conduce to the same result. Superstition, lack of education, barbarity etc., make practice even dangerous for inland physicians. In fact, Sayda, a physician educated in Egypt, and an apothecary, who also practised medicine, when the cholera in 1875 swept off their patients, were stoned in the Biblical style!

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[1] The condition of general, and more especially of medical culture among the Turks of the present day, is strikingly shown by the fact that a short time ago (1875) the Sultana Validé, i. e. the mother of the Sultan, revived an old law, according to which, after the succession was secured, all pregnant women in the palace must suffer abortion, or all children who came into the world should be killed by neglecting to tie the umbilical cord! Abortions are very general in Turkey, partly with the object of preserving the charms of the women, partly to avoid being bound to any definite man in case the female is a slave who may be subsequently set free. Many nuptials thus become unfruitful, even if this does not result from too early marriage (10–12 years). Turkish women with three children are therefore a rare exception (Köllner), and Turks, who, like the Mahdi, leave 35 wives at once in an interesting condition, no longer exist. For the poor Turks such extravagance is no longer practicable! Most of them are actually monogamists.

Legal medicine, if we may speak of such a science in Turkey, is yet in the same position which it occupied with us during the Middle Ages. At best it amounts to no more than the external inspection of the body in cases of manslaughter, murder etc. — The insane, until a short time ago, were kept in iron collars and chains in genuine mediæval style. Now there is, indeed, an asylum for the insane in Topfaschi, but for the most part only dangerous cases are received here. The remainder are treated at home by exorcisms, or allowed to run about at will, even in the paradisiacal costume of Adam and Eve. A few years ago the couching of cataract was performed by the ordinary popular physicians and rude empirics, and even in Constantinople "an old Turk, who, sitting in a court-yard, received and operated upon his patients," enjoyed the utmost confidence. (T. Hirschberg).

The institutions for the instruction of military physicians in Galata-Serai are said to be good. "The course in one of these schools embraces a period of ten years, four of which are passed in the preparatory school, and six in that of the medical department proper." The physician must then pass two years more in the military service, where, however, in strong contrast with our service, in which the physician begins with the rank of vice-sergeant, he enters wlth the rank of captain.

Besides physicians (*hechim*), there are in the army surgeons (*djerrah*) and assistants (*timardschi*). In 1877 each batallion in the field was required to have two surgeons, and each regiment one regimental surgeon, with whom was also associated an physician. Each company was to have an ambulance corps of eight soldiers and two beasts of burden, the latter of which (in old Byzantine style) bore on each side a cushioned bag or basket for the reception of the wounded.

The Sultan of course has his body-physicians and body-surgeons, the chief of whom bear the titles Hechim-Baschi and Djerrah-Baschi. In 1880 he had also his court astrologers. Pharmaceutical matters are organized (on paper) after the French style, and apothecaries are expected to be educated in the schools. They often take the place of the very ignorant Turkish physicians. Many of them are Greeks, Armenians etc.; others, natives of the West, and of course never of the best class. National Turkish preparations are the Madjum and the Tenasukh, which are consumed in large quantities—even by the Sultan—and are to be regarded as soporific and aphrodisiac remedies.

Military physicians are the most highly esteemed by both the people and the officials. On the other hand the few district physicians (*memleket hekimi*), composed chiefly of rejected and inefficient pupils of the imperial schools, are poor fellows who are half-starved in spite of a monthly salary of $75 (which, however, is never paid), and who, therefore, as a rule keep a kind of pharmacy or medical booth, by the profits of which they support themselves. They are never called in by the common people, and are exempt from the poll-tax. The busiest fellows are the popular physicians (Volksärzte), and among these chiefly the Chodschas.[1] They feel the pulse (the only means of making a diagnosis known to them!), and then hang upon the patient amulets inscribed with passages from the Koran, or they pronounce a charm over him and finally breathe upon him with their garlicky breath—a Chodscha with an agreeable breath is a famous man! For pay they receive offerings in kind, just as did the oldest physicians among the Hellenes. These offerings consist mostly of eggs, or a fowl. Next to the Chodschas come the barbers; itinerant lithotomists, some of them shepherds by calling, who perform lithotomy, often quite skilfully with a pocket-knife; dervishes who practise a theurgic medicine and sell universal remedies — e. g. blood-stone (*kantaschi*) for all hæmorrhages; *panzechir*, i. e. gall-stones of a ruminant, useful against all poisons and diseases, if it please Allah; olibanum for urinary calculus; amulets for the same purpose, and useful besides against the devil and "the evil eye"; cords knotted or furnished with buttons, which serve as a kind of rosary for saying prayers, and, if often kissed, are useful against fevers etc. Besides these are old women who brew potions, free negresses, so-called Bobbali, who practise medical incantations against evil spirits of different degree; "Persians," who are reputed to be good oculists, and finally the Kali Tatri whose acquaintance we shall make in a subsequent paragraph.[2] All these characters, however, are not specifically Turkish, but are found with every people in their age of rudeness or semi-civilization. For only the most highly civilized states possess a well arranged medical faculty, and even with them it is accompanied by a multitude of charlatans of all kinds.

Medical and pharmaceutical affairs in Roumania, like those of Turkey, are arranged chiefly upon the French model.

The same is true of modern Greece, though here some German regulations also make their appearance.

A medical school or Faculty has existed in Athens since 1833. Popular physicians, who perform even major operations and travel throughout the whole Orient, are the Kali Tatri, mentioned above. These are members of certain Greek families, who practise in accordance with ancient tradition, and give to their medical knowledge the air of an hereditary secret, thus representing as it were a posthumous progeny of the ancient Greek itinerant Asclepiadæ. Popular medicine flourishes generally in modern Greece, just as in the Orient proper. God, the devil, enchantment, "worms" etc. are considered causes of disease. Prayer, exorcism and magic arts, certain saints (e. g. St. Vissunas in coughs, St. Jacob in deafness, St. Varvara in small-pox etc.), charms containing the name of Christ, God and the holy virgin (all mediæval relics!), in epidemics circumscribing the affected locality with a new plough and heifers, both

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1. That is "Learned in the Holy Writ" (Koran).
2. In surgical operations of importance, a license from the magistrates (*sened*) is appropriate, to avoid the necessity of indemnifying the relatives in case the operation has an unfortunate result.

of which are then buried (the latter alive!) — all these are regarded as effective medical agents.

The Arabian tribes, both the independent and those subject to the Turkish rule, show, even less than the Turks themselves, any traces of an original medical development. On the contrary they cherish the corrupted relics of the old Arabian medicine, richly garnished with superstition and even idolatry. Popular physicians and learned Hakim practise magic medicine, prepare philters, and administer, or have hung up, scraps of paper inscribed with verses from the Koran. They, however, also esteem the science of foreign physicians, but only so far as it does not offend against the Koran and strict orthodoxy. Old women, instructed in midwifery by their own repeated experiences, fill the position of midwives even to-day, just as they did in the West until the beginning of the modern period.

The present inhabitants of Egypt, on the other hand, under a government (in an oriental point of view) more enlightened, manifest, at least in regard to medicine, a greater capacity for education. They have their own good institutions of instruction, supplied with native and foreign teachers, including among them the eminent physicians Clot-Bey, Billharz and Bulard, with the apothecary Pruner-Bey, of Pfreimed in Bavaria, who died in 1882 at the age of 74, having written in 1847 his famous work on the diseases of the Orient. In these schools are educated physicians, veterinarians, apothecaries and native midwives, the latter of whom professor Winkel in Munich found (at least some of them) well instructed even in operative measures. The schools are constructed upon the French model. Moreover many Egyptians study at European universities, so that the Egyptian medicine of to-day may be considered a tolerably perfect off-shoot of the European or French science. There exist well-conducted hospitals in connection with the schools, e. g. at Abu-Zabel,[1] Cairo, Alexandria etc.

The Abyssinians, although possessed of tolerably high natural endowments even in the arts (painting, the art of the goldsmith), are yet devoted to prayer and sunk in the grossest superstitions, sprinkling with holy water by the priests, enchantments, amulets etc. This ought not to surprise us when we consider their Christianity, which is purely external, though strongly idolatrous. They even have no midwives, though they employ drugs empirically, particularly in the treatment of worms, a disease necessarily frequent among them from their common use of the juice of raw beef. In its treatment the indigenous kousso is the favorite remedy.

According to Gerhard Rohlfs, the leprous are given prolonged baths, and take internally a decoction of sarsaparilla, while they wear amulets about the head (like the Arabs, Berbers and Turks), although the chief sacerdotal physician declared all these measures ineffective. Syphilis too is treated with prayers and amulets, though recently sarsaparilla and mercury have come into use. Spitting in the eyes is regarded as an excellent remedy for the diseases of these organs. Epileptics are beaten, under the idea that they are possessed of the devil. Scaly eruptions are very frequent, for the Abyssinians never wash, but anoint themselves abundantly with butter. Circumcision is practised even on maidens, in consequence of their tendency to excessive hypertrophy of the labia minora. Carrion-crows, hyænas, jackals etc. perform the duties of medical police after battles. During epidemic diseases etc., earthen pipes, about 20 inches deep, are left in the ground forming the floor of the house, to serve as privies, and when these are sufficiently full they are covered over lightly and a new one put into position. These give rise to foul odors and frequent disease! Wounded enemies are slain or castrated. Putting out the eyes is a frequent punishment, and is performed by the smiths with a red-hot iron. Lepers roam about the country begging, but are excluded from the villages.

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[1] A town of Middle Egypt, 14 miles north of Cairo. (H.)

The negroes too everywhere have faith in talismans, fetiches etc. Accordingly almost all tribes have magicians, who are at the same time priests, rain-makers etc., and by means of poisonous potions provide for the execution of God's judgments. Among the Zulus the rain-doctors are called Tnwula, the witch doctors Tsinjanja. It is the special business of the latter to look out for witches, to whom all diseases and deaths are ascribed, as was generally the case among us during the Middle Ages. Besides this, it is their duty to interpret dreams, since in these the Ttongo, i. e. the spirit of the dead, is manifested, a manifestation useful as a remedy in diseases. These dream-specialists often become wealthy, as they are richly rewarded with cattle. Diseases are likewise regarded as warnings from the Amatongo (the progenitors of the tribe, from whom proceeds every fortune and misfortune of their earthly descendants) when they are hungry, and to propitiate them and satisfy their hunger sacrifices are offered, which the priests of course eat. The Ukulunkulu, a kind of mythical supreme progenitors, are the teachers of oneiromancy and medication against witchcraft. On the birth of a child "everyone in the kraal eats certain drugs and a magic powder, which guard the child from malign influences. Incisions are also made into the body of the new-born infant, and the magic powder rubbed into them." Twins are disliked, and one o fthe children is, therefore, usually permitted to die. The dead are buried in the sitting posture. (Unsere Zeit, 1880.)

According to Max Buchner, the negroes of the west coast of Africa and the basin of the Congo (Bondo, Minnugs etc.) endeavor to prevent disease by sprinkling the healthy with certain decoctions. Like all negroes they employ exorcism of the fetiches, prayers, inunction, massage etc., and, in consequence of their acquaintance with the Portuguese, they likewise practise venesection. Incurable and dangerously sick patients among the tribes of south Africa (Bantu, Caffirs etc.) are isolated and abandoned to their fate, as is the custom among all uncivilized people. The popular physicians or magicians of the Bechuanas may be adduced as the type of such characters, to be met with in all early periods of human development. Their office is either hereditary, or its duties are taught for a consideration to members of other families. The tribal ruler is the chief magician, though he himself practises in a few cases only the art of rain-making, enchantment etc. Ordinarily he leaves the performance of the magic rites, the practice of medicine etc. to the Linjaka, who are acquainted with, and make use of a few medicinal herbs. The very clothing of these magicians is superstitious in its character. They are hung over with amulets, and are also painted. Their clothing proper consists of a baboon's skin and similar articles. They also impart instruction in the gathering of herbs, and the "burial of morbid matters", which they think they have removed from the sick by means of sweating, cupping etc. (a purely ontological conception of disease!). The course of instruction costs one cow! Exorcism of evil beasts and men, throwing a kind of dice to establish a diagnosis, and public exorcisms in cases of general calamity are under their special care. They also "church" lying-in women and their husbands, bless youths and maidens, and circumcise the former and, indeed, the latter also. The honorarium for the latter service is not paid to the magicians (or their heirs) until the maidens are married. Besides this they prepare remedies to render their patrons "bullet-proof" in war, and purify dwellings and women who have neglected the prescribed "purifications" during the public exorcisms. The Bafiotes, on the coast of South Guinea, practise cupping even at the present day, just as the ancient Egyptians performed the operation. Incisions are made into the skin, and upon these are placed horns, which have been sawed off to the suitable length; from these rude cups the air is exhausted by sucking, and the withdrawal of blood is thus accomplished. Midwifery is practised in Africa chiefly by women, and men are called in only in cases of necessity. Felkin even saw in Central Africa a case of Cæsarean section performed by a man. At one stroke an incision was made through both the abdominal walls and the uterus; the opening in the latter organ was then enlarged, the hæmorrhage checked by the actual cautery, and the child removed. While an assistant compressed the abdomen, the operator then removed the placenta and the clots through the os uteri. The bleeding from the abdominal walls was then checked. No sutures were placed in the walls of the uterus, but the abdominal parietes were fastened together by seven figure of 8 sutures, formed with polished iron needles and threads of bark. The wound was then dressed with a paste prepared from various roots, the woman placed quietly upon her abdomen, in order to favor perfect drainage, and the task of this African Spencer Wells was finished![1]

The negroes, like the Hottentots, have practised natural inoculation of the smallpox from remote times. Even in Central Africa, according to Livingstone, who was both a physician and missionary, inoculation is performed. In Tumale an Imam is said to have even practised a kind of auscultation in diseases of the lungs. For the propitiation of the evil spirits, and, in consequence of the great thirst of some tribes for human blood, enormous human sacrifices are offered to the bearers of disease in case of the sickness of their chiefs. Cases of death from natural causes, as well as from being devoured by crocodiles and other disagreeable accidents, are often considered by the negroes the work of a human sorcerer or of a witch. In such an event an ordeal is prepared for the real or the reputed agents of the calamity. If satisfactory evidence of their guilt seems to be obtained, they are executed by means of poisonous potions etc., especially if they are poor and unable to bribe the magician to decide in their favor, i. e. to employ a harmless drink for the ordeal. Thus for one single person, who has died of disease or of the infirmities of age, two or three times that number, or even more, of perfectly innocent persons are sacrificed — just as they were in the earlier trials for witchcraft among us whites!

In Baghirmi, which is inhabited by a mixed Arabian people, epileptics—sufferers from the morbus sacer of the Greeks — who are regarded as bewitched, are treated by being beaten to death, certainly a radical remedy. In Wadai, castration of the guards of the harem — also a safe practice! — is performed by the chief of the blacksmiths, who is in addition a kind of body-barber to the king and shaves his head every week. The same individual is also physician to the harem, and after the accession of a new king is compelled to blind all the male offspring of the former king by passing a red-hot iron across the cornea. — European civilization too seems to have already penetrated even Central Africa. The English in 1876 had erected a hospital and a pharmacy in Ujiji and Tanganyika. Unfortunately European physicians are still looked upon simply as great magicians, which is not to their advantage.

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[1] The patient was first rendered half unconscious by banana-wine, and the first incision not only penetrated the abdominal walls and the uterus, but also actually wounded the shoulder of the child. One hour after the operation the patient was doing well, and her temperature never rose above 101° F., nor her pulse above 108. On the 11th day the wound was completely healed, and the woman apparently as well as usual. (H.)

The circumcision practised by the Hovas, a Malay tribe, may perhaps be regarded as a surgical operation. Queen Ranovolona II. in 1883 provided herself with a German physician named Havemann of Rostock. — The Negro-Arabian portion of the inhabitants of Madagascar, the Salaclava, drive out those possessed with evil spirits by beating them. The practice of circumcision is so universally diffused among the negroes of South Africa that the uncircumcised are refused by the maidens; indeed the latter are themselves circumcised, and Winkel found circumcised maidens in Egypt also. Footling births and children born with teeth are put to death.

Among the people of Europe, who in progress of time have almost disappeared by intermixture with foreign blood, the Celts, who dwelt originally in France, and emigrated thence to England, occupy the first place, in consequence of their antiquity and their civilization, early introduced from the Greek settlers in Marseilles.[1] Among these the Druids,[2] who formed a guild with an elective chief, Coibhi Druid, and whose wives (?) were the Alraunen (Druidæ, Druidesses), practised as physicians. The former cured diseases by means of incantations and magic arts, as well as by the aid of herbs (especially the misletoe) collected with secret ceremonies.[3] The Alraunen or priestesses (a term also employed to designate a class of witches or idols), prophesied from the blood of their enemies whose heads they had cut off after the battle.

Among the Celtic inhabitants of Wales the bards are regarded as physicians (philosophers and astronomers).

The old Welsh physician, Cettwy, the philosopher, was the author of the following hygienic rules: 1. He who desires to attain a great age should play until he is 20, work until he is 40 and then rest to the end of his days. 2. He should rise, and go to bed with the lark. 3. He should eat when hungry, drink when thirsty, and rest when tired. 4. He should guard against too dainty food, too strong drink and too severe work. 5. He should shun strife, love peace and refrain from too much anxiety. 6. Let him be cheerful, generous and just. 7. Let him have only one wife, be strong in the faith and pure in conscience. 8. Let him be thoughtful in the morning, industrious at noon and sociable at night. 9. Let his thoughts be serene, his amusements blameless, the air wholesome for his respiration. 10. Let not his clothing be old, let his home be clean and inviting, and let him be contented with his lot. 11. Let his clothing be light, his food light and his heart light. 12. Let his demeanor be affable, his mind active. 13. Let him observe the laws of his country, the duties of his calling and the commands of the gods. 14. Thereby will his body be healthy, his feelings light and his conscience pure. 15. His life will be long and his end blessed. — These rules if observed to-day would be profitable to everyone. The physician of the domestics of the old kings of Wales was called Meddyd, and belonged, as among the Romans, to the servile class.

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[1] As they believed in the transmigration of souls their civilization was probably derived in part also from the Egyptians

[2] Their pupils were instructed orally alone, and were not permitted to write down their verses, but were required to learn them by heart, a process which (according to Cæsar "De bello Gallico", VI.) often required twenty years.

[3] Druids clad in white cut it with a golden sickle and collected it in white napkins, since, in order to retain its efficacy, it must not touch the earth. Even at the present day the farmers at Christmas hang it up in their homes, and on New Year's Day in England a youth may kiss the maidens with impunity under the misletoe — a process in which the plant seems to retain something of its magic and fascinating powers.

Our German forefathers, so highly extolled in the writings of Tacitus, also possessed healing witches and idols. The latter, dipped in water, imparted to this fluid the power to remove all diseases, both of man and beast, to ease the pangs of labor and to put an end to unfruitfulness in married women, precisely like certain of our medical springs of the present day. Amulets were also worn.

Equally ancient with the Celts are the Scandinavians, whose medical mythology displays among the demi-gods a female Æsculapius, Eira, another goddess, Fricco, invoked for fruitfulness in wedlock, and Holla, the aider of women in labor. On the other hand, Hela, a ghastly form, received all those who died of disease into her residence Niflheim, which contained the hall Elidnir (pain), her bed Koer (disease) and the table Hungur. Some fragments of genuine medical practice and information of a later period have also been preserved to us. Thus the Scandinavian physicians in cases of dropsy are said to have had recourse to the actual cautery, and in asthma to have resorted to venesection, while for bearing the wounded those warriors were selected who possessed soft hands. Their anatomy mentions 214 bones, 315 vessels and only 30 teeth. Their physiology locates love in the liver, passion in the bile, memory in the brain — data which remind us of Indian ideas.

Among the people of the North the ancient Prussians possessed the most complete medical mythology. In their trinity of Pikollos, Potrimpos and Perkunnos, the latter was the dispenser of health. He also maintained a sacred fire, whose ashes cured almost all diseases, save those sent directly as punishment for sins. In his daily journey as isochronous god of the sun, the rough country doctor became so dusty that Perkunatete must perforce administer to him a bath every evening. Besides the sacred ashes, a popular remedy was the water of the sacred springs in the vicinity of the temples, which was, however, to be first purchased from the priests. The chief temple was located at Romove. Laima was the goddess of parturient and unfruitful women, the latter of whom were relieved by the skin of sacred serpents. Yet if the care of these serpents was neglected by the inhabitants, they might become genuine causes of disease. Ausweikis passed for the Æsculapius of the Prussians, and was, therefore, invoked by all the sick and feeble. Gittina was the bearer of painful death.

The Sclavs, who in the 6th century A. D. drove out the Germans and immigrated into their present home, like their descendants of the present day, superstitiously accused the Zernebogs of introducing diseases. Many diseases, too, had special goblins as their authors; the nightmare e. g. was ascribed to Kodotta. The appearance of the spectre Smertnitza announced immediate death to the sick, and the convulsions and death-rattle of the dying were evidences of the force employed by her in the separation of soul and body. The Sclavs of themselves, however, never advanced beyond the first traces of theurgic medicine.

Medical superstition, magic etc. are very prevalent among the masses even to-day, and the clergy, together with the Vidatschi (i. e. magicians, who never operate unsuccessfully) and the lay brothers vie with each other in theurgic or semi-theurgic practice. To these must be added the Wratschars and Wratscharitzas, who prepare mystical potions.—In Servia we find, however, an entirely modern medical and military system, though it is not very thoroughly carried out.

Recently the Sclavs have joined with energy in the march of advancing science, following chiefly the lead of the Germans and the French. — Roumanian medicine is also connected with the French. The latter people likewise exercise the predominant influence among the Russians, with whom, particularly in the frontier and larger cities, the relations of practice are for the most part the same as with us. On the other hand, in many districts of the interior, in spite of the existence of district physicians, a scarcity of medical men prevails, so that in numerous places within the borders of this colossal empire the great land-holders or their wives supply medical attendance to the common people, at least in internal diseases. — Among many tribes in southern Russia and in the Asiatic portions of the empire, attention to medical art is still considered an occupation unworthy of a man, and medicine is therefore practised by women of the same tribe, or by Russian women residing in the vicinity.[1] Indeed in consequence of this prejudice the government is compelled to send female physicians to these tribes. Pay, when demanded, consists of presents, more rarely of money. That superstitious practices frequently slip in, under the guise of medical art, among these degraded people is the less astonishing, when we reflect that among us the grossest superstition in regard to the treatment of diseases daily raises its unabashed head. — In Montenegro in 1875 there were no physicians, and even no midwives, so that in difficult labors outrageous and dangerous cruelties, like those of the Siamese, were practised upon the unfortunate sufferers.

Even among the Samoyedes (Lapps) we may recognize traces of a theurgic medicine. According to their ideas demon-priests control health by propitiating the evil spirits, the Tatebi.

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[1] This is an example historically remarkable, but not unique, of a population which accepts only female physicians.

One of their invocations runs: "I have brought thee an offering; I have satisfied thee, and thy belly is now full etc. Grant us, I pray thee now, a blessing for our beasts and our health."

The Esquimaux, their neighbors on the western continent, also display similar traces of theurgic medicine. They believe in ubiquitous good and evil Innuits, the latter of whom may be appeased by the Angekoks, who are at once magicians and physicians. To the latter they apply for the cure of disease and to foretell death. These Angekoks understand themselves very well, and are said to have practised massage from time immemorial.

The Indians of North America have in their conjurors (medicine-men) a class of physicians who ally themselves with Manittu, the great spirit, in order to be able to foretell whether the patient is curable or not.

In some tribes these conjurers are called Medas, and pronounce incantations and health-charms. The Dacotah's have amulets of various sizes, scarcely any two of which are alike, but the composition of each of which is revealed by Wakan-tanga in a dream. The portable amulets are called medicines. Besides these they have others, designed to be placed in front of the wigwams, and called great medicines. Both varieties are considered extremely sacred. Among the Sioux, after the usual exorcisms, incisions are made in the skin of the forehead and abdomen, and the blood is then sucked out by women in order to remove the disease.

The Chunipies, on the outbreak of the small-pox, avoid the direct road and travel in curves and serpentine courses. Other Indians follow the same custom. (According to Dr. Sepp, this habit is analogous to the earlier "plague-dances", designed to propitiate the deity, and to the "grave-dances", still customary in the Orient. In Sachsenhausen, near Frankfort-on-the-Main, as late as the beginning of the present century, dances were performed in the church-yard, and the "Schäfflertanz", practised yet every ten years in Munich, is merely an anachronistic plague-dance.)

The medical mythology of the ancient Aztecs of Mexico, the brave sons of Montezuma (died 1520 A. D.), with all their devotion to cruel religious sacrifices, was very complete. They had a special Æsculapius, Ixtitlon, whose wife, Tzapotleman, was the discoverer of healing spices. Tetzcatlipoca, however, the god of providence, passed for the author of diseases, which he sent as punishment for evil deeds. They had priestly physicians, the Teopixqui. These endeavored to prevent or improve false positions of the fœtus by kneading the belly of the pregnant woman from the 7th month on. If the child did not thereby assume the correct position, the mother was seized by the legs and shaken until the head presented itself (as among the Japanese). The Aztec priests practised circumcision, and even beasts were nursed and cared for by physicians.

Even the Caribees constructed for themselves at least a heaven, Hujukhu, where there were no diseases, and where many wives and plenty of intoxicating drinks were promised to the men. They also practised a kind of circumcision.

The Indians of Florida likewise had their physicians, Jawas.

"When they wish to cure a patient, they are accustomed to rub him, press him, to bite and blow upon him, and finally, by strong suction upon some portion of his body, they shuffle out a fish-bone, a thorn or a bone, which they then declare the cause of the disease. Others perform very dangerous manipulations upon themselves, instead of upon the patient, and, in order to propitiate the evil spirit, swallow knives, stones and gun-barrels. These physicians are particularly cunning and crafty."

The physicians of the natives of Guiana, who are called "Piay", one of whom is possessed by each tribe, manage in a similar way. They treat the sick by prayer, blowing upon and scratching with a fragment of stone the painful points, and then sucking out the blood. Their whole body is striped with red paint—the special color of the Faculty! Upon the head they wear three feathers, and upon the shoulders two wings.[1]

The sons of the sun, the Incas of Peru, possessed so high a civilization, that they enjoyed a complete political system, and had attained great advancement in architecture, road-building, postal arrangements etc., while even in art and dramatic works of metrical form (some of which have been recently translated into German) they were by no means deficient. They likewise employed numerous medicinal drugs, pre-eminent among which was the cinchona. Led by empirical instinct these people had employed the bark in appropriate cases, long before the Europeans had learned from them its properties. They had no special god of medicine, and indeed recognized only one god, Pachacamac. At the festival called Citua, the feast of atonement, the Inca consecrated four sons of the sun, who by means of this ordination became physicians.

As the Peruvians, like the Egyptians, were devoted to the cultus of the dead, they preserved their corpses partly in bales of grass and woven materials, rolled up like mummies. Finally the inhabitants of Terra del Fuego have conjurers, and, according to the account of an English physician, the defunct members of the medical profession—epileptics are its chosen representatives—are regarded as genuine devils, to be kept off by appropriate ceremonies. The dead are converted into skeletons by a noble lady immediately after death, and the bones are then buried provisorily, until some flesh still clinging to them is removed by putrefaction. When this process is completed, the skeleton is finally placed in a grave in the sitting posture.

Among all Indian tribes we have found undoubted traces of principles of medicine, and from these there would unquestionably have been constructed (as among civilized peoples in the course of centuries) a real science of medicine, had not a home and freedom, the life-blood of all independent progress, been cruelly cut off by the race-destroying whites. Alas, however, the whole race will ere long be exterminated, and thenceforward exist only as an impeachment of their destroyers before the tribunal of history! Yet their medicine had already attained the same height reached by that of the Greeks but a short time before Homer! That medical ideas and practices, whatever their kind, belong to the earliest manifestations of human thought, is shown by even the natives of New Holland, who occupy the lowest grade in the scale of civilization. They possess priests, Karraji, of the good and evil spirit (Koyan and Petoyan), who are likewise physicians, curing wounds and diseases, and foretelling the future. At King George's Sound these priest-physicians are called Mulgaradok, and are highly esteemed, inasmuch as they know how to create and disperse tempests, rain and diseases. In Hawaii they are called Kahuna-laau, and by prayers and sacrifices, especially of dogs and swine, they propitiate the divinity. In the Feejee Islands, however, the physician bears the ironical title of "The Carpenter of Death". The ordinary obstetricians of the Sandwich Islands are old men, who take the parturient women on their knees and rub the abdomen from behind until the child is expelled. The umbilical cord is then cut long. Women draw the tongue of the mother out of her mouth until she vomits and the after-birth comes away. Next the mother takes a bath in the sea, and at once resumes her ordinary duties. If the labor is difficult, the attendants know that they have to do with a half-breed with a large head, and the child is ordinarily killed, as is usual among other uncivilized people. The South Sea Islanders know how to perform trepanning, and the natives of Australia perform even ovariotomy, and produce artificial hypospadias by slitting up the urethra to produce sterility and impotence. (H. Tillmanns.) On the other hand, many Polynesian tribes practise circumcision to facilitate coitus.

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[1] My own humble opinion is that this red paint of the Piays is a prehistoric example of the later red cloak of the Faculty. As the Indians wear no clothing, they can, of course, replace the latter only with red paint. The three feathers may point to their license to practise medicine, surgery and midwifery, and the two wings may indicate that they enjoy high flights of thought as investigators, as well as practitioners. If such a medical man should conclude to practise among us civilized people, he would certainly at the present day find an enormous practice among high and low—except in the diseases of children!

If the medical ideas and customs set forth in the foregoing pages (and their number might easily be increased) are wanting in thoroughly scientific and technical value, they yet undoubtedly furnish evidence that no people exists without medical views and regulations of *some* kind, and that medical efforts and conceptions, though only under the form of rude superstition and belief in witchcraft and similar phenomena of a more highly developed theology, belong among the earliest manifestations of the infancy of human civilization. Indeed we may affirm that medical defence against diseases and death is a fundamental characteristic of man even in primeval periods, and one which distinguishes him from all other beings. Hence these accounts possess, as we believe, a certain value for the history of the development of humanity, and not simply for that of medicine. From all the foregoing considerations there seems to be the greatest probability that the necessity for medical aid in the widest sense, the dread of, and resistance to, the annihilation of our being, were the chief agents in the formation of religious representatives and conceptions, as an expression of the natural instinct of self-preservation directed primarily to the body. It is also quite possible that a medical necessity (if such an expression is allowable) may have been the fundamental cause of the origin of religion, and consequently of the beginning of a higher civilization among all people. Disease with its consequences, pain, helplessness, destitution and despair of earthly aid, may well have been the proper source of the belief in a supernatural helper, just as we now observe daily that disease with its consequences disposes even the most sensible to the acceptance, or readmission of superstitious practices. Certain it is, at all events, that medical and religious ideas originated at least contemporaneously in the earliest ages of human history, for nearly all the earliest gods of almost every people were also gods of medicine, and almost all the priests of the gods were in like manner physicians.

From the special data furnished in our last section a prehistoric medicine might almost be constructed, especially with the aid of the statements regarding the people, who at the present day occupy the lowest grade of civilization. In fact the latter are still found in their prehistoric phase of development, a phase which the civilized nations proper have long passed, and concerning which all written information is either entirely wanting, or preserved only sparingly in saga and tradition. But without much danger of error we may infer the character of prehistoric medicine from the analogous conditions of the rude tribes of the present day. Hence the medical customs and practices, as well as the medical personnel of these tribes now devoted to destruction, acquire the greatest interest in the history of civilization.

Medicine, in the childhood of mankind, was regarded partly, if not entirely, as a kind of religion, and its practice was a religious occupation, while its results were the united work of gods and men. Among all races, but especially among the Semitic, all diseases were considered originally (and even after the opening of a tolerably high civilization) visitations or punishments from some god or another, who must be propitiated and called upon for aid and cure, and this idea is so firmly rooted in the less highly cultivated portion of mankind, that, as we know, it is retained by even "the faithful" of the present day. Religion and medicine, the latter of which was among all people originally theurgic and grossly empirical, separated from each other at first gradually, and medicine after a long period then first reached the point which for that early day must be called the beginning of science. Yet its character and extent, like the civilization of the people to whom it belonged, did not at first attain a grade which we are accustomed to dignify by the name of science. Here too our ideas must be guided by the people of the age, and the civilization to which they had already attained. The medicine of the people already mentioned, in order to win our respect, and indeed our admiration, must be measured by the rule of civilization of their period, the civilization which they could, or actually did, attain.[1]

The medical culture already described (except much of that in the last section) belongs to the last half of the first great wave of civilization known to us, and which completed its descending course in the trough represented by the beginning of the Middle Ages. From this trough arose a second wave of civilization, upon whose crest we now stand. Whether other waves preceded that first one, we know not: but such an assumption is not opposed to the experience of history.

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[1] The discovery of human skulls of the neolithic period, bearing evidences of trepanning, deserves notice here as an example of prehistoric surgical practice. An excellent résumé of our knowledge on this subject by Robert Fletcher, M. R. C. S. Eng., A. A. Surg., U. S. A., will be found in the "U. S. Geographical and Geological Survey of the Rocky Mountain Region," vol. v., 1882. Evidences of the prehistoric existence of syphilis, in both Europe and America, are also constantly accumulating, and may already claim to have rendered quite probable such an early existence of this reputed modern disease. (H.)

The preceding remarks have proven, and what follows will further prove, that medical culture, like human culture in general, "transforms itself in accordance with eternal laws, in substance the same, in forms differing through the ever new expression of the ages and their guiding thoughts." (Gregorovius Siciliana, IV., p. 138.)

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SECTION SECOND.

THE MEDICAL CULTURE OF THOSE NATIONS WHOSE DEVELOPMENT IN MEDICINE HAS BEEN OR IS PROGRESSIVE.

FIRST PERIOD.

ANTIQUITY.

THE MEDICINE OF THE GREEKS (AND ROMANS) DOWN TO THE PERIOD OF THE OVERTHROW OF THE WESTERN EMPIRE IN THE YEAR 476 A. D.

A. MEDICINE UNDER THE INFLUENCE OF GRECIAN VIEWS.

I. THE MEDICINE OF THE GREEKS.

The intimate connexion of later grades of the development of humanity with those which have gone before, is almost always most pleasantly shown by the history of civilization, although frequently manifested in only a few facts, which illuminate, like the electric light, the dark paths of human culture. And our knowledge of these paths, and of the methods by which humanity has effected its intellectual extension from people to people in the course of centuries, has recently so greatly increased that very many preceding gaps and interruptions are filled up, or bridged over, by researches in comparative philology, by the study of the monuments, by the exhumation of objects of artistic and technical, as well as of luxurious and ordinary use, and finally by the discovery of very ancient records etc., just as in the physical world we learn to explain the origin of later forms and species from an examination of those which have long since perished.

Thus the Greeks undoubtedly incorporated into their own culture original portions of the primitive civilizations which we have already considered. We need mention only the use of letters and mathematics, which they borrowed from the Phœnicians and Egyptians; the very early examples of art with which the excavations at Tiryns (founded, according to Schliemann, B. C. 1500) and Mycenæ have recently made us familiar, and which point to a "prehistoric," pre-Homeric or pre-Hellenic civilization, at one time to Scythian, at another to Phrygian and Thracian tribes, now to Asiatic, again to Egyptian[1] models. But we should specially recall the fact that much of the old Egyptian medicine is met with again in the Greek (even in that of Hippocrates), and particularly in the Alexandrian medicine. The Greeks, however, in accordance with their happy mental organization, raised these foreign elements at once to an extraordinary perfection and development. Whatever they touched intellectually, or incorporated from without, they improved, purified, elevated and refined. The simple knowledge of these primitive peoples they developed and elevated into the liberal sciences, which they created, and the stereotyped, mechanical forms of the former became, under their hands, a genuine art, which seeks and conceals its laws, not in external precepts, but in its own inmost being.

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[1] The oldest forms of the gods among the Greeks also had the heads of animals!

Thus, in accordance with their peculiar disposition, they exercised a unique influence upon all futurity, and became naturally the leaders of the whole great second phase of civilization (after the disappearance of the first Egyptian and Semitic phase), among whose sustaining factors we too belong.

Accordingly no people of history has exercised so controlling an influence upon the formation of all succeeding humanity — and with it upon the medicine of all civilized people—as the ancient Greeks; and no people too has since attained such a harmony of mental culture. Poets, artists, historians, philosophers, mathematicians and physicians admire, even to-day, the Hellenic spirit, and adopt its works as their models—that spirit at once so rich, so deep, so graceful and so comprehensive, as to worthily deserve the imitation of all posterity. Coupled with creative fancy and, therefore, strong in formative power, it interwove the world with magic forms of noblest poesy, and beautified the existence of mankind with higher ideals of every art. For to the Hellenes, above all other people, artistic creation was given by nature as their peculiar inheritance. In earnest and most profound intellectual labor too the Greeks created lofty models for all exalted effort, whose eternal worth is based upon their perfection and their direction to the great whole. For the Greek mind strove always for the profound and the entire, and was always directed more to the essence of things, not so much to fleeting appearances. It was not contented with knowledge alone, in medicine with "facts" alone, but ever sought likewise the inmost essence, aim and object. It contemplated the world from general standpoints, not passing from the special to the general so frequently as we ourselves do.

The world of appearances, which demands minute observation of nature or absolute experiment, remained to them almost a stranger; at least their services in this sphere were not great. The Greeks, indeed, strove after a knowledge of the world of appearances, but still more after a knowledge of their essence and their ground; in medicine more after a knowledge of disease in itself, than of individual species of disease and their peculiar phenomena.

They proved their profound and yet practical sense too in treating and striving to cure rather sickness than diseases; for sickness in the abstract continues, even to-day, the most successful point of attack for medical art, which is unable to battle against, and to conquer, as such, the individual diseases laid down in the books.

The Hellenes found in medicine all the elements of a philosophy, in the physician, the philosopher (*ἰητρὸς γὰρ φιλόσοφος ἰσόθεος*): they always, and especially in their best classical period, considered medical practice and medical treatment a genuine art, and the physician himself at once a philosopher and an artist.

1. MYTHICAL AND SACERDOTAL MEDICINE. THE MEDICINE OF HOMER.

The Hellenes, like all other people, assigned to medicine as its founders and supporters certain ever-ruling gods and godesses. Transforming human efforts and hopes for the alleviation of human sufferings and infirmities into poetic creations, they thus produced their individual deities, obeying in this, with refined sensibility and like "genuine, joyous heathen", rather the laws of the beautiful than those religious precepts which characterized the gloomy and coarsely sensual Semitic races. Thus Hera (Juno), the justly jealous and irritable wife of the highest of the gods, concealing the amorous deeds of the cloud-glittering Zeus, and prone to curtain-lectures, was the natural protectress of lawful and conjugal birth, while in union with her obstetrical daughter Ilithyia, she rebuked with stern austerity all offences against the code of morality. This fact Alcmene and even Leto, the mother of twin gods, learned by sad experience. Juno, Apollo (Pæan) and Artemis were also deities of healing. Apollo the bearer of pestilence, Artemis the goddess of parturition. The latter, indeed, terrified by her mother's pangs at her own birth, besought from Zeus the favor of eternal virginity; yet, in admiration of the beauty of the sleeping Endymion, she yielded to all-powerful nature, drew the youth with her own hands into a cave, and in punishment of her earlier prudery, by a truly godlike superfœcundation, became the mother of fifty daughters at once. Pallas Athene, on the contrary, the special patroness of the eyes (but fortunately more learned, and thus a sterile blue-stocking), though the protectress of mighty warriors, remained yet a virgin.

The proper god of medicine was Æsculapius, son of Coronis and Apollo, "bearded son of a beardless sire," as the Greeks jestingly said. His life was with difficulty preserved; for Apollo brought the pregnant Coronis (who nevertheless is said to have been betrothed to Ischys) to the funeral pile, and only by taking him out of his mother's womb was Æsculapius saved, begotten, like other great men, in concubinage, and born by Cæsarean section. According to other authorities, Arsinoë was his mother. If he was in danger of being burned in the womb of Coronis, he is said, on the other hand, to have been abandoned by Arsinoë after birth, and to have been saved from starvation by a goat, thus affording us the first example of the artificial feeding of children. The wife of Æsculapius in his first marriage was Epione, who was accorded divine honors with him. His second wife was Lampetia, daughter of the sun-god. The former bore to him Hygieia, the constant companion and colleague of her father, and the feeder of his serpent (the symbol of rejuvenation, and probably also an indication of the earlier serpent-worship of the magicians), as well as Machaon and Podalirius, "good physicians both." Besides these, Panacea (whose temple stood at Oropus), Jaso and Ægle were children of Æsculapius by Epione, while Janiscon and Alexanor were his sons by Lampetia. Telesphorus, the bearer of convalescence, is often found in attendance upon Æsculapius, and is represented as a boy with a long robe and a Phrygian cap. Mythology also derives Æsculapius from Memphis in Egypt, and declares that he immigrated into Greece, bringing medicine with him; a myth from which we might also conclude that Egyptian medicine was the mother of the Greek.

Æsculapius received instruction in the healing art from Chiron, who, in spite of his offensive combination, half horse, half man, was the most versatile, famous and popular of the celestial professors.

Orpheus, Medea, Circe, Hercules, Prometheus and Melampus were also associated with the earliest medicine of the Greeks. Hercules was the discoverer of warm baths (hence called Heraclean), and a mythical hygienist.

The services of Æsculapius (who has also been considered a real physician of about the period B. C. 1250), were especially of a surgical nature, but extended likewise to internal diseases. In addition to natural remedies, he employed magic songs to aid their effect:

"Lulling the pain with force of soothing charm,
Refreshing drinks he gave, or grateful salve
Unto their wounds applied; employed the knife
To raise up others from their bed of pain."

In consequence of the unexampled results of his art Æsculapius made himself hateful to Pluto, who accordingly accused him to Zeus of desolating the realm of shades, (such a charge would scarcely pass muster to-day, in spite of unnumbered Æsculapii!) and Zeus slew him with his thunderbolt, a mythical and palpable declaration that the law of death could not be altered in favor of physicians.

After his death he was exalted to the position of the god of medicine, and a special cultus was introduced by his priests. The places devoted to his cultus were the so-called Asclepieia, of which the most famous were at Tricca, Epidaurus, Cos, Cnidos, Pergamus, Mycenæ and Sicyon.

These localities were situated on wooded slopes, or in the vicinity of medicinal springs, and contained images of the god, and, of course, many priests, who, among the Greeks too, inaugurated civilization, and, like the mediæval monks, selected the best positions. Neither dying persons nor parturient women were permitted to remain in their vicinity, a sanitary regulation imitated to-day in some of our bathing, and other private medical, institutions. For the reception of the sick, or their representatives, in the sacred treatment, there were, however, inns and boarding houses connected with the temple, but the capacity of these was never sufficient for the demand. The proceedings of the priests were somewhat as follows: the patient, or his deputy, was prepared by the interdiction of certain kinds of food and of wine, or by absolute fasting; for without such preparation no person might enter the temple. As he entered the latter, the priests in their robes, accompanied by their daughters, recounted wonderful stories of the deeds of the god, of cures effected, and of remedies, whereby the imagination of the patient, and his expectations, of course, were excited to the highest pitch, and the ground levelled for what was to follow. Next came prayers and a bath in the warm or cold springs, followed by frictions and inunction of the body and other manipulations. Then was arranged before the statue of the god the offering, in the shape of a cock or a ram, which was, of course, of more importance to the priest than to the god. Now followed, in the presence of the priests, or in the vicinity of the temple, the ceremony of Incubation, during which, according to Aristophanes, all kinds of pranks were practised, even down to absolute vulgarity. Sleep, through the preceding excitement of the imagination, was filled with dreams, whose interpretation was the business of the priests. The latter now, however, ordered certain remedies, e. g. cathartics, emetics, bleeding—according to all accounts to an enormous extent,—fasting etc. If a cure followed, then the will of the god had been obeyed; but if not, then the patient had always in some way committed an oversight,—just as is the case with some doctors to-day. If the patient was cured, the convalescent then offered consecrated offerings, e. g. golden, or ivory, or terra cotta (museum in Naples) models of the diseased parts (anathemata); or he hung medals upon the legs of the god, which were then carried off by the priests. In certain emples the medical history of the convalescent and the remedies employed in the case were inscribed upon the posts of the temple, or upon suspended votive tablets, which thus served a purpose similar to the crutches of the cured hung up in certain of our baths and pilgrim-resorts of to-day, but also had this advantage, that they furnished to the later science of therapeutics its first empirical principles. The purport of one of these tablets of a later period was as follows:

"Julian, after spitting blood, seemed hopelessly lost. The god ordered him to come and take from the altar pistachio nuts, and to eat these for three days mixed with honey. He was restored and came and thanked the god before the people."

We see that then, as now, confiding simplicity enjoyed the best claim to success. Yet such theurgic customs had likewise their realistic side, if such an expression is allowable. If, for instance, a valuable remedy was discovered, its composition was engraved upon the posts of the temple, or upon special tablets, and thus was finally collected a kind of pathology and a store of drugs, such as may have given origin e. g. to the "Coan Prognoses".

The priests of Æsculapius were not, however, the direct founders of Grecian medicine. This was the work of the Asclepiadæ, guilds of purely lay physicians, which existed in various localities, even where there were no famous sanctuaries of Æsculapius (e. g. in Crotona), and whose members—like the Kali Tatri of the Orient to-day—traveled about in the practice of their profession and to make their fortune. These were called to attend the sick, or were visited by the latter at their own residences. Some of them acquired special reputation and won posthumous fame, even as writers. Doubtless these were the most highly gifted and the best educated, who gained their higher education chiefly from intercourse with celebrated men whom they met in their travels. In fact it was in this way that the ancient Greeks generally obtained their higher education, and not from frequenting schools. Of course the most famous Asclepiads were great travelers, even Hippocrates, the most distinguished of them all. These Asclepiadæ, however, who were considered, and professed to be descendants of Æsculapius, originally appropriated the substance of the medicine of the temples, and increased it by such drugs as were discovered by any of their members. Possibly (as there is nothing new under the sun) some of the original assistants of the priests, entrusted with the administration or preparation of the medicaments prescribed by the latter (in spite of their generally theurgic treatment), may have finally emancipated themselves entirely, and set up business on their own account in the neighborhood of the temples. These gradually expanded their business beside that of the priests, just as we shall see done *mutatis mutandis* in Salerno, which was also originally a place of miraculous cures, and then developed into that school of physicians, which, during the Middle Ages, was as famous as any of the Asclepions. These Asclepiadæ bequeathed[1] their knowledge to their descendants, or to those received into their guild, who, by this reception, became genuine "Asclepiadæ".

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[1] All the earliest intellectual creations were preserved by oral tradition from teacher to pupil, and it was not until a later period that they were fixed by writing. In order to be learned more easily they were composed in verse, e. g. the Vedas, Homer, the verses of the Druids etc. Among the Greeks the Aoidoi were the

In Homer's poems we find no intimation of the worship of Æsculapius, though Herodotus, who places Homer in the 9th century B. C., considers and designates him the chief manufacturer of gods. It may, therefore, have originated after the age of the poet. Æsculapius is mentioned only as an unrivalled physician and as the father of Machaon and Podalirius. The latter were not only physicians, but also warriors in the fray, and accordingly placed upon complete equality with the other combatants, for

"Full thirty sail the sparkling waves divide,
Which Podalirius and Machaon guide."

They were held in high esteem, for

"A wise physician skilled our wounds to heal
Is more than armies to the public weal."

And were manifestly, in that day, regarded as artists, not as tradesmen:

"Who then will ask a stranger to his board,
Except a public servant; in a word
A seer, physician in our times of need,
Or architect, or bard inspired to lead
Our hearts to joy by strains of godlike song."

Pæeon (Pæon), who healed with divine celerity the wound of Ares,

"Thus he who shakes Olympus with his nod
Then gave to Pæon's care the bleeding god.
With gentle hand the balm he poured around.
And healed the immortal flesh, and closed the wound,"

was physician to the wounded gods.

Besides these "men of healing," or to use our modern term, "army surgeons," Homer also introduces female physicians. Helen, Agamede, "the fair-haired, who all healing herbs well knew," and others.

Internal medicine was not entirely unknown in Homeric antiquity, but surgery was the chief business of the physicians. They cut out, or drew forth, darts, swords and lances, checked the hæmorrhage, washed the wounds with tepid water, applied bandages after sprinkling them with soothing drugs, and in addition administered a restorative drink. There were no stationary or movable field-hospitals, but the soldiers' tents or barracks took their place, and possibly also served for the reception of the wounded

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guardians of these verses. The earliest written works of the Greeks were accounts of travels by land or sea (periodoi or periplus), and were written upon small pieces of leather (diphtherai) by the Logographoi about the 6th century B. C. Anaximander also wrote out his philosophical rules of life. It was not until the introduction of papyrus from Egypt that a written literature became possible. The earliest collections of Greek literature were made by Peisistratus and Polycrates (Max Müller). Hippocrates was the first to commit medical ideas to writing, and thus became the father of medical literature or medicine. Before his day it had been taught orally only among the Greeks.

and the sick. (Frolich.) Internal diseases are never mentioned by Homer, except an epidemic of nine days excited by the darts of Apollo.[1]

Homer's anatomical knowledge does not exceed those rudiments to be acquired by the slaughter and eating of animals. Sinews, bones, intestines etc. are mentioned, terms which correspond very closely with those of Hippocrates.

His acquaintance with materia medica is equally scanty. It is certain, however, that he was acquainted with Egyptian drugs, of which there was a very large number, for Helen gives to Telemachus such a drug, which she had received from queen Polydamna, wife of the Theban king Thon. (Lauth.) Homer also says that all the Egyptians were physicians. Besides charms, we may conjecture something in the line of medicine in the "drink of oblivion"[2] (opium), to which may be added such dietetic remedies as the odorous onion (eaten freely and gladly, together with garlic, by the ancient Greeks, in spite of their devotion to the beautiful), honey, wine etc. Chief of all, however, was the bath, followed by inunction. After Homer's time Machaon was regarded rather as a surgeon, and Podalirius as a physician.

2. THE PHILOSOPHY OF THE GREEKS DOWN TO THE TIME OF PLATO, AND ITS SHARE IN THE THEORY AND MATERIAL OF MEDICINE.

(ABOUT B. C. 600 TO B. C. 430.)

The philosophy of the Greeks exercised so essential an influence upon their medicine—the philosophers were not only metaphysicians, but also physicists (natural philosophers), and many of them also physicians — that the fundamental doctrines of the former formed the theoretical principles of the latter, and we cannot well keep the two separate. Above all, the method of investigation of the Grecian philosophers at any given period was the method employed in medicine at the same period, and the same has been the case even down to our own day. Hence the whole medicine of the Greeks bears the special character of a philosophical science, if we except that of Hippocrates alone. He among all the Ancients was almost the only one who, while cultivating tried observation and experience, yet yielded its proper place to pure reason as such, and trod the analytico-synthetic path.

That civilization made its entrance into Greece proper in part from Asia and Egypt, and by way of Ionia and the islands, is shown by the earliest natural philosophy developed after the primitive Gnosticism, the so-called

IONIC SCHOOL (ABOUT 600 B. C.)

Its founder was *Thales of Miletus* (639–544 B. C.), a pupil of the Egyptian priests and a contemporary of Alcæus of Mytilene (about 600 B. C.) and Sappho (about 628–568 B. C.). He assumed water and reason (deity) as the principle and first cause of all things. Of these the first predominates, and in all transformations of form in the secondary elements — earth, air and fire — preserves its characteristics. In mechanical separation and union, or through active contraction and dilatation, of these elements everything which exists has its origin. Thales is said to have been the first to introduce geometry from Egypt. *Anaximander of Miletus* (born B. C. 611) assumed undivided matter (τὸ ἄπειρον) as the primary principle, from which heat, cold, dryness and moisture developed themselves in such a way that the kindred principles found themselves united (elective affinity). On the other hand *Anaximenes of Miletus* (B. C. 570–500) considered air in its essence the unchangeable principle of all things, ascribing to it immeasurability, endlessness and constant motion as characteristics. Either he or Anaximander brought the sun-dial into Greece. *Heraclitus of Ephesus* (about 556–460 B. C.), "the weeping philosopher", "the obscure", assumes fire as the primal matter, and enmity (πόλεμος, ἔρις) of the minutest parts as the cause of decay, while their friendship (ὁμολογία, εἰρήνη) is the ground of origin of all things. An anima mundi is the sculptor of the equally fiery human soul, which latter is derived from the former in respiration. He derives the embryo from the male semen alone, assigning to the uterus simply the role of a place of development. Far more important is the philosophy of *Anaxagoras of Clazomenæ* in Asia Minor (B. C. 500–428), the teacher of Pericles (died of the plague B. C. 429), and likewise an able astronomer. He regarded the planets and the moon as bodies analogous to the earth, and considered the moon to be inhabited. He was a kind of ancient Galilei, inasmuch as he was accused and convicted of impiety by the Eumolpidæ on account of his doctrines, but escaped punishment by flight. Anaxagoras assumed matter and spirit (νοῦς) as the elementary principles of the world, of which the first consisted of innumerable, similar most minute particles (Homœomeriæ), transformed by the creative activity of the spirit into animate and inanimate objects, and governed as dead matter. His physiological and pathological views are as follows: The animal body, by means of a kind of affinity, appropriates to itself from the nutritive supply the portions similar to itself. Males originate in the right, females in the left side of the uterus. Diseases are occasioned by the bile, which penetrates into the blood-vessels, the lungs and the pleura. *Diogenes of Apollonia* (B. C. 550–460), the founder of a theory of vessels, in which are contained intimations of the left ventricle, the aorta, the carotid and the pulse, assumed air as the fundamental element, from which matter and spirit, all things in general, are formed, and from which everything receives life. In the animal body it goes from the left ventricle into all the vessels, and mingles there with the blood. — The most important influence upon later times was exercised by *Empedocles of Agrigentum* (B. C. 504–443), who assumed the four elements, Water, Air, Fire and Earth. Nothing can either originate or be destroyed, but all changes are simply those of form. Every thing originates in the friendship (φιλία) everything is destroyed by the enmity, (i. e. separation) of these elements. Men, beasts and plants he considered demons punished by banishment, who, through purification, might again attain to a residence in the Sphairos, the seat of the gods. It was in accordance with these views that he treated all diseases by theurgic means.[1] The sex of the embryo was determined by the predominance of heat or cold in the parents. He believed that the embryo was nourished through the navel, and to him we owe the terms amnion and chorion.

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[1] A pestilence in Crete, which has been associated with the siege of Troy, also falls in the age of Homer. It may be remarked here that the "evil eye", so much dreaded even at the present day in the Orient, e. g. by the negroes, the modern Greeks and the inhabitants of southern Italy, played a great role in etiology, even in the days of Homer.

[2] Nepenthe. (H.)

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[1] However he also banished epidemics by building fires and draining the water from swamps, a proceeding which Nægeli has recently again recommended on the principles of bacteriology. In contrast with Homer he understood the etiology of pestilential diseases, and introduced a treatment in some respects quite realistic, leaving out the gods and working himself.

Death, however, resulted from the extinction of heat, the effect of separation of the elements. Expiration arose from motion of the blood upwards, and consequently of the air outwards; inspiration, in an inverse way. He desired to be considered a god and to appear, like a god, in the dress of a charlatan (Gregorovius). He is said to have raised a woman from the dead (most of these people raised from the dead are women!), and to have gone into heaven in a blaze of glory, i. e to have been received among the gods. The

ITALIAN SCHOOL, OR SCHOOL OF CROTONA. (ESTABLISHED ABOUT B. C. 550),

was founded by *Pythagoras of Samos* (B. C. 580–489) at Crotona in Magna Græcia, whither he had fled before Polycrates, the tyrant of his native land. He had visited Egypt and acquired in that birthplace of mathematics the principles of his doctrine, —another evidence of the influence of that primeval home of civilization upon Grecian science. His teacher was Onnuphris (Unnofre) of Heliopolis. Pythagoras formed at the outset a sect of his followers, who should make it their study to rule their whole life by definite principles, among which were included some of a medicinal or dietetic character. Number, as the purest conception, formed the basis of his philosophy. Unity was the symbol of perfection, the first cause of all things, God himself. The number 2 represented the material world. The whole universe was based upon the number 12, which is divisible into thrice 4: whence we have 3 worlds and 4 spheres. These in turn result from the 4 elements, — water, air, fire and earth. The corporeal elements are comprised in the number 10, in which again each single number has its counterpart. Bodies originate under various combinations of the endless and unendless, the direct and indirect, unity and plurality, right and left, male and female the motionless and the moving, the straight and curved, the bright and dark, the good and evil, the square and parallelogram, opposites 10 by 10 together. All this united forms the *Music of the Spheres.* The animal soul is an emanation from the anima mundi, and consists of the intellect, the reason and the soul proper. God is the soul universal, light of lights, author of himself. Between the two exists a gradation of higher or lower beings (demons). Man is the lowest of the higher and the highest of the lower beings. He was the first among the Greeks to teach the immortality of the soul and the decay of the body after death, though others affirm that the same thing was taught by his master Pherecydes of Syracuse. After death the human soul ascends or descends, the former for reward, the latter for punishment: hence the doctrine of metempsychosis. Nature is capable of the highest perfection. — The basis of life is heat. New life originates from the semen (which springs from the male brain and contains a warm halitus) together with the moisture of the brain of the female. The semen is the foam of the noblest blood. The good is like unity, godlike. Striving after this gives moral health. Diet and gymnastics however serve to maintain physical health. In diseases, which are occasioned by the demons, prayer, offerings and music to restore the harmony of the spirits are useful. Magic virtues reside in certain plants, e. g. the cabbage (a special food of the sect), squill and anise. Surgical interference is inadmissible; salves and poultices, on the other hand, are allowable. This medley of high sounding, but groundless, sentences maintained great influence in succeeding ages even in medicine. — Among the pupils of Pythagoras *Alcmæon of Crotona* (Bruttium, in Magna Græcia, B. C 500,) was the most famous in medicine. He was manifestly the first (animal) anatomist and is said to have discovered the optic nerves and the Eustachian tubes. In physiology he likewise admits the origin of the semen from the brain, and believes that the head of the fœtus is the first part developed. Health depends upon harmony, disease upon discord, of the component parts of the body, of heat and cold, dryness and moisture, bitterness and sweetness etc.,—a doctrine amplified in later systems of medicine.

His theory of hearing, of which Theophrastus, of Eresus, (according to Albert) gives an account, is very well worth notice: "We hear with the ear because it contains a vacuum, and this occasions the sound. In the cavity, however, the sound is generated, the air resounding against it." In generation both parents furnish semen, and whichever of the two supplies the most, this one determines the sex of the embryo.

In consequence of the banishment of the Pythagoreans from Crotona (about B. C. 500), such philosophic physicians, so-called "Periodentæ" (itinerant physicians), spread themselves abroad in all directions. Among them *Democedes*, court-physician of Polycrates of Samos (535-522 B. C.),[1] was especially notable. He received an annual salary of about $2,000 from Polycrates, and after his death went to the court of Persia, where he cured Darius of a dislocation, which his Egyptian physicians did not understand how to relieve, and his wife, Atossa, of an abscess of the breast. Other distinguished "Periodentæ" were Acron of Agrigentum, who put an end to the plague of Athens, though this is also ascribed to Hippocrates, Metrodorus and Epicharmus (540-450 B. C.).

THE ELEATIC SCHOOL

was founded by *Xenophanes of Colophon*, in Elis, about B. C. 450. The Eleatics held God and the world to be one and the same thing, and were also pantheists.

THE MATERIALISTIC (ATOMIC) PHILOSOPHY (B. C. 450),

of *Leucippus*, a contemporary of Pythagoras, and of *Democritus of Abdera* in Thrace, the "laughing philosopher" (460-360 B. C.), one of the greatest spirits of all time, rejected creative reason, and replaced it by necessity. It sought in matter the foundation of the world and of thought; indeed it professed to find the principle of all things in the infinitely minute, identical, not eternal nor illimitably divisible, but still infinitely numerous Atoms. Within these reside order, position, form and motion. They differ in size, and to this difference their weight corresponds. The differences of the elements, fire, water, air and earth, depend upon differences in the form and size of the atoms. The soul consists of round and smooth atoms, and its expressions, like life in general, are a result of the motion of the atoms. These smooth and round atoms exist in the whole body. In special parts they are particularly active, so that the heart e. g. occasions wrath; the liver, desire; the brain, thought. The perceptions of the senses originate in the motion of the atoms of external objects (whose image they are) toward our organs of sense, and produce in these organs a palpable impression, the perception. Spirit and body are identical; a healthy condition of the brain implies mental health; and disease of the same organ implies mental disease, —a point of view not reached again until the 18th century. No medical writings of Democritus are at present extant. They related to epidemics (which he explained by a downfall of the atoms of destroyed heavenly bodies), and also to fever, diet, prognosis, hydrophobia etc.

In a considerably less degree the following systems also were concerned in the development of the theory of medicine. The School of Sophists, the founders of which were *Gorgias of Leontium*[2] (B. C. 485-378), and *Protagoras of Abdera*[3] (B. C.

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[1] According to Herodotus, Polycrates brought the physicians of Crotona into reputation. Next to them in fame stood those of Cyrene.

[2] In Sicily, whose population, according to Gregorovius, even at the present day, has sophistical tendencies.

[3] As an example of his precepts, we quote: "Man is the measure of all things; of those which are, that they are; of those which are not, that they are not. "Contradictory affirmations are equally true." (He might have added, "Doubtful things are uncertain." H.)

489–404), degraded philosophy into mere dialectic artifices, in order to utilize the masses both politically and materially for their own advantage. Their greatest opponent, though himself educated in their art, was *Socrates* (B. C. 469–399), a contemporary of Hippocrates, and the profound creator of a purer conception of morality, who fell a victim to Athenian intolerance and persecution. The pupils of Socrates, *Euclides of Megara* (about B. C. 400), and *Phædon of Eretria*, in Eubœa, discarded completely the perceptions of the senses, and allowed them no existence whatever. *Aristippus of Cyrene* (B. C. 435), however, was the founder of the Cyrenaic School, which rejected all systems of morals and declared pleasure the highest and only good. On the other hand, *Antisthenes of Athens* (born B. C. 444) preached absolute contempt for riches, the vanities of this world, and for science itself, and thus became the founder of the School of Cynics, whose best known member was his pupil, *Diogenes* (B. C. 414–324).

In concluding this section it may be remarked that in Greece it was not entirely devoid of danger to be possessed of an eminent mind, and particularly to teach in opposition to the superstition and credulity of the masses and the prejudices and authority of the priests. As early as B. C. 432, on motion of Diopeithes, a special paragraph against those who denied God, and studied nature, was incorporated in the legal code of Athens.

3. SCHOOLS OF THE ASCLEPIADÆ AND GYMNASTS.

From societies founded by Æsculapius, or rather from medical associations simply named after him, proceeded those medical guilds or "faculties" (to explain ancient economy by our own), which are distinguished as the schools of the Asclepiadæ. These were devoted to medical instruction and practice, and divided their doctrines into exoteric and esoteric. Indeed medicine at this period was rather a faculty united with the individual and maintained as a secret, than a science possessed of fixed rules and diffused by writings. It was chiefly a system bequeathed immediately from father to son or to pupil; an art preserved and transmitted by oral instruction from man to man.—In these schools of the Asclepiadæ (as in the later schools of the Jews and the Arabians, and the Christian Cathredal schools) instruction in medicine began at an early age (10–12 years), and was imparted not solely to those who belonged by birth to the family of a physician, but also to others who were merely adopted, in order that they might select a teacher from this family, who instructed them in return for a certain honorarium.[1] At the conclusion of their course of instruction the pupils were compelled to take, and subscribe to, an oath, the words of which we here introduce as the oldest written monument of Grecian medicine:

"I swear by Apollo, the physician, by Æsculapius, by Hygeia, Panacea, and all the gods and goddesses, that, according to my ability and judgment, I will keep this oath and stipulation, to reckon him who teaches me this art equally dear to me as my parents: to share my substance with him and relieve his necessities, if required; to look upon his offspring on the same footing as my own brothers, and to teach them this art, if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and every other mode of instruction, I will impart a knowledge of this art to my own sons, to those of my teachers, and to disciples bound by a stipulation and oath according to the law of medicine, but to no others. I will follow that system of regimen which, according to my ability and judgment, I consider for the benefit of of my patients; and abstain from whatever is deleterious and mischievous; I will give no deadly medicine to any one, if asked, nor suggest any such counsel; and in like manner I will not give a woman a pessary to produce an abortion.[1] With purity and with holiness I will pass my life and practise my art. I will not cut persons laboring under the stone, but will leave this to be done by men who are practitioners of this work. Into whatever houses I enter, I will go into them for the benefit of the sick, and will abstain from every voluntary act of mischief and corruption; and, further, from the seduction of females and males, of freemen and slaves. Whatever, in connection with my professional practice, or not in connection with it, I see or hear, I will not divulge, as reckoning that all such things should be kept secret. While I continue to keep this oath inviolate, may it be granted to me to enjoy life and the practice of my art, respected by all men at all times! But, should I trespass and violate this oath, may the reverse be my lot!"

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[1] The Sophists were the first teachers in Greece who imparted instruction for money. Their fees were often very high. Gorgias demanded 190 minae (about $3,350) from each pupil. Yet it was regarded as a disgrace that they took pay for instruction; and, as the same thing was done by teachers of medicine, it is probable that the latter did not belong to the higher classes of Grecian freemen.

Such schools of the Asclepiadæ[2] existed in Rhodes, Crotona in lower Italy, and Cyrene, now Barca, on the northern coast of Africa. The most celebrated, however, were those of Cnidos in Asia Minor, and Cos (now Stanchio), one of the Sporades.

The school of Cnidos (in Caria) is said to have laid especial weight upon the subjective statements of the sick, the relation of the symptoms to individual parts of the body and the use of active remedies, especially drastics (coccum Gnidium, the berries of the Daphne Gnidium). Less attention was devoted to diet. It cultivated the science of diagnostics and recognized some auscultatory signs, e. g. the pleuritic friction sound (!), and satisfactorily distinguished many diseases, such as phthisis, typhus, diseases of the urinary bladder, the kidneys, the bile etc. The Cnidians also performed even major operations, like trepanning the ribs, excision of the kidneys (recently revived as something new!) etc., and though always empirics, they were bold operators. In opposition to the physicians of Cos, however, they discarded venesection. The Cnidian Sentences[3] are supposed

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1. Latin "neque simili ratione mulieri pessum subdititium ad fœtum corrumpendum exhibebo."

2. There were guild-schools for the bards also at this period. With regard to these, Mæhly (Geschichte der antiken Lit.) says: "But how were these bards educated? By family and oral traditions. These bard-schools represented simply an enlarged family union, which, perhaps, felt itself entwined by the ethical bond of common duties. That a definite technique, with fixed rules, was thus bequeathed, is clear." The same thing, *mutatis mutandis*, is doubtless true, also, for the contemporary schools of the Asclepiadæ. In the latter, of course, Hippocrates filled the place of Homer.

3. The "Cnidian Sentences" was probably a collection of aphorisms culled from the votive tablets of the temple of Æsculapius, at Cnidos. Euryphon, a senior contemporary of the great Hippocrates, is said to have been the compiler. They

to have emanated from this school. Among the famous physicians of the school of Cnidos were Eudoxus (B. C. 408–355); Ctesias, physician at the court of Atarxerxes I. (B. C. 465–425), who has been already mentioned in the section on Indian medicine, and who, as an historian, was called by the ancients a liar and a fabulist; Euryphon, who is said to have been the author of the Cnidian Sentences, and to have been the first to employ the actual cautery; Nicomachus, the father of Aristotle, and others.

The school of Cos (which was flourishing as early as B. C. 600), in contrast to that of Cnidos, cultivated especially objective investigations, symptomatology, prognosis, the relation of the symptoms to the entire body, etiology, and expectant and mild therapeutics, though it recommended venesection: in short it practised all that we can praise in the medicine of Hippocrates and the Hippocratists. These two schools are the first examples of those two opposing tendencies which have characterized medicine down to the present day, and which have always, alas, made war upon each other; for in therapeutics, the most uncertain branch of uncertain medicine, each boasted, and could boast, of equally good results! Among the physicians of Cos the following are specially well known: Apollonides; Nebrus; his son Gnosidicus; Hippocrates I., the son of Gnosidicus, a contemporary of Miltiades (died B. C. 489), and the grandfather of Hippocrates the Great.

Far beneath the pupils of the schools of the Asclepiadæ stood

THE GYMNASTS.

These were originally teachers of gymnastic exercises, but as Aliptæ also took charge of bathing and anointing the body, furnished assistance in cases of wounds, fractures and dislocations, and dabbled bravely likewise in internal medicine. Their superintendent was the gymnasiarch, whose office, the gymnasiarchia (i. e. the oversight of the gymnastic exercises, the gymnasia and the instruction in the agonistic sports, which formed a part of the public festivals) was a high official position; for triumph in these contests was valued more highly than one in the intellectual field! Beneath him stood the xystarch who had charge of the apparatus. Among the gymnasts the following were especially famous: Iccus of Tarentum, who devoted himself chiefly to dietetics; Herodicus of Selymbria in Thrace (called also Prodicus, and Herodicus of Megara), a teacher of Hippocrates, who treated even acute diseases by gymnastic exercises, e. g. wrestling, pedestrian tours, long races etc., and it is said to have been the first to demand medical honoraria in place of the free-will offerings heretofore customary. The union of gymnastics with medicine Plato (Politics, book I.) calls one of the greatest of nuisances.

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are quoted by Plato, the comic poet (B. C. 440), noticed by Hippocrates, and were in existence as late as the time of Galen (A. D. 170). Littré conjectures that several books preserved in the Hippocratic collection may be the offspring of the school of Cnidos. (Oeuvres d'Hippocrat, tom. vii, p. 304.) (H.)

These gymnasts must not, however, be confounded with the athletæ, who cultivated mere bodily activity and skill in certain special exercises, and were pugilists and wrestlers. They were compelled to abstain from wine and women, and had special regulations as to food (something like our trainers of the present day; there is nothing new under the sun!), which latter consisted of roast meat, dry diet etc., in order to preserve their strength. With the same object they practised inunction, for the ancients considered inunction of the skin, even with simple oil, a means of hardening themselves.

4. THE MEDICAL FACULTY ABOUT THE TIME OF HIPPOCRATES.

It should be remarked at the outset that the medical profession among the Greeks, as among the Orientals, was always held in great respect. Moreover, both before and during the age of Hippocrates, the practice and social position of physicians were in many respects very similar to those which exist among us. Physicians generally practised both medicine and surgery, i. e. they were general practitioners. There were also medical professors and students, though the former limited their activity to private teaching. No formal matriculation seems to have taken place, but on leaving the teacher or medical "school" the oath quoted above (the model of our doctors' oath) was administered. Moreover there were physicians appointed by the State, who even presented their own qualifications in the public assembly by a speech, somewhat as the English physicians of the present day do in the papers when they desire to obtain a hospital position. These might be called State-physicians. Besides these there were physicians chosen and paid by certain communities, for the special purpose of taking care of the poor free of expense — communal or charity physicians. Then there were simple practising physicians who either had permanent residences, or were so-called "periodeutæ" (itinerant physicians, like the itinerant bards of that period), and who practised from city to city. Some of these carried along with them their own drug shops. There were also court physicians who practised, often with high salaries ($1100-2200), at the court of foreign tyrants or kings, and were frequently the ordinary physicians of these princes, like the Jewish physicians of the Middle Ages. Finally, even at this early period, there were army and naval surgeons also, who were engaged for certain definite periods, e. g. for a single campaign.

Inscriptions have been discovered containing the agreements of such physicians, and specifying their duties, salary etc. Donations for special services were given to physicians at a very early period. Thus a physician, Onasilos and his brother, as early as the 5th century B. C., received lands from king Stasikypros, of Idalion, in return for their disinterested aid on occasion of a massacre of the citizens of that city by the Persians.

Whether there were regular surgeons with the armies, and if so, how many were allotted to each division, is unknown. That such physicians existed, however, at an early period, may be inferred from the fact that, according to the laws of Lycurgus, (about B. C. 800) their presence was required among the Spartans. It would thus seem as if surgeons were one of the earliest products of war. Lycurgus classed them among the "officials", not as combatants, a position which they also occupied in the

German army down to 1870. Hippocrates too permitted his son Thessalus to accompany Alcibiades (B. C. 451–404) to Sicily, in the position of army-physician. Critobulus cured the wound of Philip of Macedon (B. C. 382–336), received during the siege of Methone, though only with the loss of vision in the wounded eye. Alexander (B. C. 356–323), we know, had Philip of Acarnania as his ordinary physician, and the latter has become the classical model of medical honesty and fidelity. From the same, or a later period we know Callisthenes, whose unfortunate fate has secured for him lasting remembrance; Glaucias, Alexippus, Critodemus, Androcydes and Pausanias. Since, however, Xenophon (B. C. 445–354) had eight field-surgeons with his "Ten Thousand", we may infer, as Hecker believes, that one surgeon was attached to about each 1,000 of the troops (chiliarchia). We find no mention of special field-hospitals, though these existed among the Egyptians from whom the Greeks borrowed many regulations. The sick and wounded were sheltered in the neighboring villages and cities; while on the march they were carried in rear of the troops. In camp they were placed in ordinary tents. (See the "Anabasis").[1] Young and old women from "the baggage"—so Xenophon says—shared in the care of the wounded, so that we see this class following the military hosts of that day as well as the mercenary troops of a later period. Markets too were held in the camps (an antique style of suttling), though, as a rule, the requisitions and thefts were not confined to the simple necessaries of life, for everything was regarded as booty.

Famous and popular physicians had their assistants who, for the most part, took care of slaves and the poor, and were notorious for their roughness. Finally there were natural-physicians (indeed even popular writers on medicine), bathing-physicians (for the wealthy of Athens even now went to the baths in summer), magicians, male and female empirics and midwives, in whose hands was placed the entire practice of obstetrics, except formidable operations after the death of the child. The latter were practised by men alone, and most frequently resulted in the death of the mother.

The midwives were called "navel-cutters" (*omphalotomai*), and at a later period *maiai*, and in addition to the ordinary services of a midwife, including kneading and rubbing the abdomen to improve the position of the child, the administration of medicines etc., they also undertook the execution and direction of the sacred songs sung during labor. In children born apparently dead they pressed the blood back out of the umbilical vessels, presented the new-born to the father, in order that he might lift it and thus acknowledge it for his own, determined the existence of pregnancy, produced abortions, and exposed the children, if requested—a practice allowed without question. In consequence too of their knowledge as to what parties were physically suited to each other (for the Greeks looked upon matrimony as a purely sexual institution), they had a kind of antique matrimonial bureaus, and took charge of those who "found it necessary to withdraw from observation for a considerable period",—for the most part exactly as they do with us! The midwives also treated the diseases of women, but were distinct from the "Doctresses", like Aspasia and Artemisia, who occupied themselves particularly with cosmetics and free-love.

For the exercise of medical practice, which was very often carried on for a long distance from the permanent residence of the physician, there was required (in certain provinces only) some evidence of capacity in the form of a certificate from his teacher. In general, however, practice was perfectly free, as it is with us to-day, except that while free physicians might treat all patients, without regard to their social position, servile physicians could treat slaves only, a restriction based upon the social ideas of the Ancients, and prevailing also in other arts. Malpractice was not liable to punishment. The treatment was carried on either at the house of the patient, or in the Iatreion of the physician.

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[1] It may be remarked, *en passant*, that Xenophon mentions snow-blindness in this book, and reccommends for its prevention that something black be held before the eyes.

These Iatreia, places for prescribing or operating, at once clinics for out-patients and private hospitals, form the most striking peculiarity of Greek practice, and were pretty numerous. The sick, however, could enjoy in them only a temporary reception, though they were mostly very spacious and supplied with all necessary apparatus and instruments. The latter were often spread out ostentatiously, in the style of charlatans, and were made of costly and glittering materials,—an old "humbug" met with here and there even to-day![1] These medical shops for the most part enjoyed a good business and (like the barber shops of the Middle Ages) served also as places of amusement, in the absence of saloons and newspapers, to spread the (not infrequent) scandals of Antiquity. Besides private Iatreia, there were also others belonging to certain communities and to the state, and designed for the care of the poor; but hospitals, in our sense of the term, did not exist in Grecian antiquity.

Most physicians[2] occupied themselves with general practice, as the science of medicine itself was still quite simple and midwifery was not as yet separated from surgery,—a separation not made until after the Middle Ages. A few only were specialists, chiefly the lithotomists whose occupation, as is manifest from the terms of the Hippocratic oath, was generally considered a disreputable one. Yet oculists and dentists seem to have been specialists also.

Besides skilful physicians, many of whom enjoyed a general education and possessed philosophic minds, there was, of course, a crowd of charlatans; and besides medical men whose walk was worthy of their calling, there were fools. Hence strife, envy and other evils were prevalent, so that at times, even among the Greeks, the medical profession could no longer be reckoned a respectable one.[3] An experience which that profession, alas, has been compelled to suffer among many nations and for long periods of time. From this statement must of course be excepted many physicians who lived and labored with high honor. Even Hippocrates declared:

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1. Ivory stethoscopes inlaid with gold among the coryphaei! "The ignorant physicians have ivory boxes, silver cupping apparatus and knives inlaid with gold made for them. But when compelled to use these instruments, they do not know how to handle them, and an expert, with a rusty, but sharp, knife, must free the patients from their suffering." (Lucian.)
2. As regards the number of physicians in ancient Athens, nothing can be said. Whether it ever reached the 160 living at the present day in that city is doubtful. Instruction in the 22 preparatory schools of the kingdom is free, and anyone can go from these to the university at Athens. A portion of the students of this institution earn their living by blacking boots etc. (See Urlichs.)
3. Besides soothsayers, sophists etc., Aristophanes declares that physicians owe their existence to the clouds.

"Through our wrangling the whole art has fallen into great disrepute among the laity, so that they do not believe even in the existence of an art of healing. For in acute diseases practitioners differ so widely from each other, that what one declares to be the best treatment is rejected by another as bad. In this way medicine may be compared to the art of the soothsayer, who holds as propitious the bird which appears on the left, while the same bird appearing upon the right is considered unlucky. In like manner from the flight of birds one soothsayer will predict one thing, another, another." (Hæser.)

The honorarium of the physician consisted originally of voluntary offerings, but at a later period its amount was determined by an agreement entered into before the treatment was begun. The Hippocratists, however, from feelings of delicacy and honor, never adopted the latter custom, probably because they did not consider their profession a trade in wares. Moreover, there were city and district physicians, and for these public physicians there were provided fixed salaries. The latter were often relatively high, as e. g. at Athens, where an annual salary of $1,875 was once paid to a physician.

A large sum which furnishes a measure and evidence of the prosperity of Athens in its days of glory! A good horse in the time of Xenophon was worth $150; a chœnix (about one quart) of meal — the daily ration of a slave — cost at the same time about 18 cents, and, from the scarcity of corn-land in Greece, often more. Of wine and meat—the Greeks, in contrast to the Romans, cultivated cattle-raising more than agriculture — there was no lack, especially as the Greeks, in addition to game, poultry and particularly fish, ate all kinds of domestic animals, hogs, horses, asses, dogs and even foxes, hedgehogs etc. Moreover prices in Greece corresponded to the fluctuating value of money. Thus in the time of Solon an ox was worth about 84 cents, and a sheep only 16 cents.

In addition to what may be called the regular faculty of medicine, there was also a considerable number of dealers in drugs, pharmacopolæ and pharmacotribæ (a special sort of merchants comparable with our grocers), who kept medicines for sale in their booths, but must not be regarded as pharmaceutists in the present sense of that term, unless we consider them a kind of old Greek apothecaries, as is often done. As a rule, however, physicians prepared and dispensed their own drugs. The class first mentioned, in addition to drugs, dealt in burning-glasses, cosmetics etc., something as our apothecaries sell petroleum-lamps, insecticides and perfumeries.

Of a still lower rank were the rhizotomists (root-cutters and gatherers), who collected drugs with strange and superstitious ceremonies, often at night. Among these were many cunning knaves and itinerant mountebanks, such as existed among the Romans and later peoples even down to the present century. The worst reputation, however, belonged to the pharmaceutriæ, a term almost synonymous with abortionists.

This class of persons must have occasioned much mischief in ancient Athens and Sparta, for Solon, in order to get rid of their business, erected B. C. 594 the first brothels, and filled them with female slaves purchased abroad, and Lycurgus published laws according to which they were driven out of the country and foreigners were licensed to prepare medicines, in their stead. Pæderasty was recommended by Solon, and instituted by the State in Sparta and Thebes, in order to prevent overpopulation. It was also recommended for the same purpose by Plato and Aristotle, and in contrast with this disgusting practice the Neo-Malthusian sponge is a remedy of immaculate purity!

Finally the gymnasts also belonged to the medical profession of the ancient Greeks.

That veterinary physicians existed in Grecian antiquity may be concluded from the fact that the diseases and anatomy of animals were discussed by very early writers, e. g. by Aristotle. Even regular physicians occupied themselves, as much as they could, with the treatment of animals, especially that of horses. The Greeks possessed also sanitary officials who had the oversight of street-cleaning etc. Epaminondas, among others, was appointed such an officer, though only to humiliate him.

5. HIPPOCRATES THE GREAT, AND THE HIPPOCRATISTS.

The period of the highest political, material, artistic and literary grandeur of Greece, when the Persian wars had been fought to a victorious end, and that mournful internecine slaughter of the Greeks which bears the name of the Peloponnesian war, had not, or rather had just, begun; when poets, philosophers, artists and statesmen struggled for the victorious laurel, forming a line of combatants, such as, in innate greatness displayed upon so narrow a field, and at such a time, no people and no age has since beheld, — this period offered also the most favorable conditions for the appearance and labors of a genius who, a model to all futurity, taught those principles in accordance with which the medical art should be practised.

To characterize this age, or rather its intellectual elevation, it is doubtless sufficient to recall to the reader merely the names of a few of the great men who lived shortly before, contemporaneous with, or not long after Hippocrates, and who sealed for all succeeding centuries the supremacy of the Grecian spirit. At this time Pæonius created his Niké, Phidias in ivory, gold and marble his statue of Zeus and the Parthenon, Praxiteles his Hermes (B. C. 364); Polygnotus, Zeuxis (about B. C. 400) and Parrhasius won immortal fame as painters. Oratory shone forth in Lysias (born B. C. 458), and soon after reached its zenith in Æschines (B. C. 392–317) and especially in Demosthenes (B. C. 385–322). Philosophers like Anaxagoras, Protagoras of Abdera, Prodicus of Ceos and other Sophists, Democritus of Abdera, Socrates, Plato and many others, established the laws of human thought and human existence, as well as those of nature. Aristotle, the greatest investigator of antiquity, followed their footsteps in the natural sciences. Herodotus (B. C. 484–407), an exception among the ancient historians who devoted themselves almost exclusively to the history of their own people, opened the road of historical investigation and devoted considerable attention to the history of the barbarians, while Thucydides and Xenophon have left us imperishable models for historical writing. The drama is the peculiar creation of the Greeks, entirely wanting among Semitic races, and in this department Æschylus (B. C. 525–456), Sophocles (B. C. 495–405) and Euripides (B. C. 480–406) have furnished us the models for tragedy, Cratinus (B. C. 520–423), Eupolis (born about B. C. 445) and Aristophanes (born about B. C. 410), for comedy, and Pindar (B. C. 521–441), for the loftier lyric art. Statesmen like Themistocles, Cimon, Miltiades, Pericles, Alcibiades, Nicias and others, representatives of the smallest of states, though supported by a great colonial power, guided the destiny of Greece, and with it the fate of the whole of the then civilized world.

In such an epoch appeared — great men are far more the offspring than the creators of their epochs—the greatest and most famous physician of all antiquity, a man endowed with the most unique gifts for his profession, HIPPOCRATES II. of Cos.

Son of the midwife Phænarete (18th in descent from Hercules) and the Asclepiad Heraclides (17th in descent from Æsculapius), he was born B. C. 460, and even during his lifetime won the title of "the Great."

That he appeared in such an age is an expression of that ever active law of national development, by virtue of which the great minds of any people appear together or in close succession to each other, and as a rule occupy but brief periods of time. In these periods too the nation itself passes through its golden age in a political, social and economical point of view, ere national vigor is corrupted and overwhelmed by the general prosperity.

The first teacher of Hippocrates was his father. Leaving, however, the guild of the Asclepiadæ in his native place, after the death of his parents he went to Athens, where the sophist Gorgias of Leontini (whose wife had been one of his patients) and his brother, the gymnast Herodicus, were his teachers. He travelled extensively (it is said for twelve years), so that he became a genuine periodeutes or itinerant physician.

This was doubtless the origin of his great power of observation, of his regard for the influence of climate and locality, the corporeal and mental constitution of men etc. He studied the book of nature (as Theophrastus von Hohenheim demanded of the true physician), and here learned to value her powers and to utilize them at the sick bed; indeed his whole therapeutic bent is commonly designated Physiatry.

Hippocrates resided in Asia Minor, on the coast of the Black Sea, upon the island of Thasos, and probably also in Egypt,[1] but lived for the greater part of his life at Larissa in Thessaly, where he is said to have died B. C. 377 (according to others 370). His tomb was shown in the vicinity of this city as late as the second century of our era.

His best epitaph is furnished by his own famous precept: "Life is short, opportunity fleeting, judgment difficult, treatment easy, thought hard, but treatment after thought is proper and profitable." An ancient plane-tree is still pointed out in Cos, beneath which Hippocrates is said to have held his consultations. Tradition, which surrounds all greatness with a halo of glory, illumined also the grave of Hippocrates with the story that a swarm of bees, whose honey was specially useful in the treatment of aphthæ in children, made their hive within its walls.

Hippocrates was the creator of profane, as distinguished from sacerdotal or guild medicine, which had prevailed until his day; of public, in

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1. Recently much of the Hippocratic writings, which had heretofore been looked upon as peculiarly Greek, has been recognized as Egyptian in its origin.

place of the preceding secret medicine. In a word he was the great creator of scientific medicine and of artistic practice.

Besides the case of the wife of Gorgias above mentioned, the plague at Athens,[1] Abdera and in Illyria, the cure of the "lovesickness" (nowadays falsely called broken heart) of king Perdiccas of Macedonia, and his professional dictum regarding the mental disease of Democritus (who was considered insane by the Abderites because he dissected animals), are mentioned as examples of his practice. A call from Artaxerxes Machrocheir (reigned 465–425 B. C.) he declined. All this, however, is unproven, as well as the absurd story that Hippocrates, before his departure from Cos, set fire to the temple of Æsculapius, in order that the honor of the invention of the "Aphorisms" might remain his without dispute. If he simply borrowed these from the temple (a charge probably partially true), it shows at least that he recognized their importance and preserved and published them, a service in itself of great medical and historical importance. The following is the genealogical tree of

HIPPOCRATES AND HIS FAMILY.

Nebrus (about 584 B. C.)
Gnosidicus, Chrysus, Elaphos.
Hippocrates I., (about 500 B. C.)
Heraclides—Phainarete.
Hippocrates II., (460–377, or 370 B. C.)
Thessalus, Draco, wife of Polybus, wife of Ctesias (?),
Hippocrates III. Hippocrates IV.
of which?
Thymbræus.
of whom?
Hippocrates V. Hippocrates VI.
of which?
Praxianax.
Hippocrates VII.

Besides these there are reckoned in the Hippocratic family Dioxippus, Philinus and Praxagoras, all of Cos, and Plistonicus, Eudoxus, Philotimus and Chrysippus of Locri. These all lived between B.C. 400 and B.C. 286, and from Thessalus down were followers of the medicine of their school.

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[1] Hippocrates does not mention this "plague". It raged B. C. 430–425, and carried off in the last year but one of its prevalence 10,000 citizens, 400 foot-soldiers and 400 cavalry. In spite of the masterly description of Thucydides, it is unsettled under what form of disease of the present day this plague should be included. Thucydides (471–400 B. C.) does not mention Hippocrates.

The Hippocratic writings[1] are written in the Ionic dialect, and are 53 in number (though divided by others into 80). But a small part of them are the work of Hippocrates himself. Some were written by one or the other of the physicians already mentioned; others by unknown physicians of the same, or a different period. They received the form in which they have descended to us chiefly in the Alexandrian period, and are accordingly defaced, and some of them entirely falsified. A few originated in the pre-Hippocratic age, others in the time of Hippocrates himself, and still others in much later ages (even after Christ). The authors are called by the generic title of Hippocratists, though differing remarkably from Hippocrates and from each other.

The philosophico-physiological and general pathological views of the Hippocratists are based upon the assumption of the four elements of Empedocles, water, fire, air and earth, whose mixture (crasis) and cardinal properties (dryness, warmth, coldness and moisture) form the body and its constituents. To these correspond the cardinal fluids, yellow bile, blood, mucus and black bile, in the order mentioned. (Here we find the first theory of humoral pathology). Health consists in a uniform, disease, in an irregular, action and reaction of all these upon and between each other. "Acridity" is also assumed as an additional cause of disease. — The fundamental condition of life is the innate heat (calidum innatum, ἔμφυτον θερμὸν), the evaporation of which occasions death. The production of heat is greatest in youth, and, therefore, at this age most nourishment is necessary, while, as this production declines in old age, the need for nourishment declines with it. The proportion also holds true in a similar way with fevers at different ages. The pneuma which, in the form of air, circulates in the vessels is, however, also necessary for the maintenance of life. Its regular circulation is the condition of health, while modifications of this beget disease. In this we must not, however, understand circulation in its modern acceptation, for Hippocrates, though holding that the blood runs to the periphery, and thence back again to the internal parts in the form of a circle, recognizes and mentions no point of origin for this circulation. A third active force in the body is the "enormon".[1] All three of these are forces inherent in the body, without manifesting any vital power of their own. — Diseases are cured by restoration of the disturbed harmony in being and action of the elements, elementary qualities, cardinal fluids and cardinal forces. Nature (φύσις), i. e. the vital forces inherent in the body, accomplishes the cure, however, in the best way. If nature works undisturbed, the disease runs a regular course through the three stages of crudity, coction and crisis. In the first of these a degeneration of the fluids predominates; in the second they are prepared for evacuation; in the third they are removed. If this course fails, and especially if the "crisis" is wanting, there result secondary diseases, or incurable conditions. The crises occur particularly upon the odd, so-called critical, days. Hence the interference of the physician (and in this his art consists) is directed always to choosing the right instant[2] for lending aid. This is especially the case in fevers, which are caused by heating or excess of mucus due to a check of the secretions. Besides the proximate causes of disease mentioned here and above, Hippocrates constructed especially the important doctrine of remote causes. Such are offences against a judicious mode of life, climatic and meteorological influences, the peculiarities of the season (constitutio annua), endemic and epidemic constitution, place of residence etc.

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[1] The following account of the doctrines of the Hippocratists, as well as the subsequent exposition of those of Galen, is arranged, for the most part, in accordance with the writings of Häser, Leclerc and others, and, in consequence of the importance of both these writers in medicine, is preserved as complete as possible.

The "Oath" is considered "pre-Hippocratic". The "De affectionibus", "De septimestri et octimestri partu", "De morbis mulierum", "De dentitione", "De embryonis excisione" and "De superfœtatione" are regarded as "Cnidian": the "Prognosticon", "Prænotationes Coacæ", "Prædicta" and others, as "Coan": the "De ære, aquis et locis", "Epidemiorum libri", "De victu in acutis", and "De capitis vulneribus", as "genuine": the "De arte", "De prisca medicina", "Lex de medico", "De liquidorum usu", "De genitura" and other (especially surgical) writings, as "contemporary": the "De natura hominis", "De glandulis", "De corde" (post-Aristotelian), "De diebus criticis" (post-Galenic) and others as "post-Hippocratic".

What singularities and (to speak mildly) what peculiar observations, incapable of justification by all the explanations, childish interpretations and praises lavished upon them, are to be found in the Hippocratic works, is shown e. g. by the following aphorisms: "A woman is never ambidextrous": "Pains extending from the spine to the elbows are removed by venesection": "Rigors in women begin chiefly from the loins, and move by the spine to the head. In men they begin more from behind than from the anterior parts of the body, as from the elbows and thighs. They have also a thin, dry skin, as shown by the hair" etc. The Hippocratic works also contain much that is incomprehensible to us. Their uncritical reference of many things to supernatural influences smacks of ignorance; their contempt for other things (especially many of the acquisitions of exact science) indicates a lack of scientific spirit.

To this was joined Dietetics, a science also founded by Hippocrates. This science regarded the age,—"Old persons use less nutriment[3] than the young",—the season,—"In winter abundant nourishment is wholesome; in summer, a more frugal diet",—the bodily condition,—"Lean persons should take little food, but this little should be fat; fat persons, on the other hand, should take much food, but it should be lean",—the habits etc. In addition, respect was also paid to the easy digestibility of food,—white meat is more easily digested than dark,—and to its preparation. Water, barley-water and wine were recommended as drinks. Baths, inunction, gymnastic exercises, and the frequent use of emetics were also commended as dietetic measures, and the dietetic principles of Hippocrates in febrile diseases are substantially observed at the present day. By means of some of the foregoing and other precepts Hippocrates extended the doctrine of indications, which constitutes one of his greatest services to medicine.

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1. The only passage of the Hippocratic writings in which this word occurs, (and if an Hibernianism may be pardoned it does not occur here) is found in the (spurious) 6th book of Epidemics, and is couched in the following terms: *Τὰ ἴσχοντα ἢ ὁρμῶντα ἢ ἐνισχόμενα σώματα.* This is unintelligible enough, and the entire importance of the "enormon" is due to Kaau-Boerhaave, who in 1745 published a work entitled, "Impetum faciens dictum Hippocratis etc.", in which he elaborated the idea of an enormon, a substance intermediate between body and spirit. (See Hecker and Haeser.) (H.)

2. This "right instant" has been familiar, but by no means definitely determinable, ever since the days of Hippocrates, and accordingly the expression may often conceal the charlatan.

3. He designates it fuel, quite in accordance with our modern theories.

The Diagnostics of Hippocrates (though he does not recognize any such special branch) was founded especially upon objective investigation by means of the senses, and made use of every aid. The ear supplied a knowledge of the mucous râle ("like the bubbling of boiling vinegar") and of succussion; the sight furnished a survey of secretion and excretion, the bodily frame, the attitude of the body and its members, the gait etc. (inspection, adspection); feeling (the hand upon the breast) supplied an idea of the bodily temperature, and perhaps likewise of the pulse (though he certainly knew nothing of counting the latter); moreover vaginal touch was practised, and the taste and sense of smell were equally put to service. The sense of touch was also armed with leaden sounds, garlic-stalks, and the like, for diagnostic purposes; the sight was assisted e. g. by specula ani. Anamnesis gave consideration to heredity, preceding diseases and tendencies to disease, as well as to such matters as experience proved to be profitable or hurtful. Yet the subjective symptoms were also not neglected.

The nearly allied science of Semeiology was still more highly elaborated. In fact the whole Greek disposition was adapted to the estimation of the normal in form, deportment etc., as a basis for the comprehension of morbid variations of all kinds; for the Greek eye had received an artistic education from the multiplicity of works of art by which it was surrounded.

One of the chief services of Hippocrates to medicine was the foundation of the science of Prognosis. This was based upon the excellent maxim: "In order to be able to prognosticate correctly who will recover and who will die, in whom the disease will be long, in whom short, one must know all the symptoms, and must weigh their relative value." It considered the perspiration, the sleep, mucous râles in the throat, the visage (facies Hippocratica) carphologia, the appearance or absence of the "crises" on the appointed days etc.

In Ætiology, he pays particular attention to age, constitution, meteorological influences etc., and utilizes in practice, as well as in prognosis, the following passage: "Catarrhs are dangerous in old people when a dry spring follows a winter with south winds and rain. If, however, the summer is dry and north winds prevail, with south winds in a rainy autumn, coughs, hoarseness and catarrhs arise."

The surgical knowledge of Hippocrates is considerable, both as regards the number of diseases recognized by him, and their treatment with or without operation. Fractures are handled particularly well as regards the method of reduction and dressing, the mode of repair, and the duration of this process. If e. g. a fracture is healed with considerable shortening, he is of the opinion that it is better to break the corresponding sound bone, so as to equalize the shortening. The same may be said of dislocations. Hippocrates e. g. recognizes luxations of the humerus inwards, downwards and outwards: "The head of the humerus is often luxated, but not upwards, in consequence of the acromion; nor backwards, by reason of the scapula; nor forwards, in consequence of the biceps muscle; but rarely inwards or outwards, yet frequently and chiefly downwards." He employs also a great number of methods of reduction. Diseases of the joints (and their treatment by massage), and wounds, especially of the skull, are well managed. The latter, in consequence of the fact that, until the time of the discovery of explosive weapons, arms designed to strike or cut were chiefly used, formed the favorite field of surgical labor. Hippocrates also recognized the fact that wounds of one of the cerebral hemispheres produce paralysis or spasms of the opposite side. The treatment and healing of wounds by first and second intention, fistulæ, ulcers and tumors were also judiciously discussed. Hernia was less fully treated.

On the other hand, his operative surgery recognizes a considerable number of instruments, but is limited in major operations to such measures as allowing the hæmorrhage to cease of itself, or through the influence of syncope, or to arresting it by the use of cold water, while a kind of amputation or rather ablation was practised e. g. in gangrene, only after formation of the line of demarcation. Hippocrates too calls war, quite justly, the school of surgeons: "He who desires to practise surgery must go to war." Trepanning, paracentesis thoracis and abdominis etc. were, however, practised. Stress was laid upon the necessity of a good position, good illumination, and good assistants in an operation; but the chief weight was placed upon the practice and the dexterity of the physician. The hot iron was employed frequently, a practice to which reference is made especially in the famous Aphorism: "What drugs fail to cure, that the iron (or knife) cures; what iron cures not, that the fire cures; but what the fire fails to cure, this must be called incurable".[1] The obstetrical operations were also assigned to operative surgery, since there was no such thing as ordinary male midwifery. His surgical therapeutics recognizes a very judicious plan for reposition of the gut in prolapsus ani, and is acquainted with luxation of the acromial end of the clavicle (the knowledge of this dislocation was entirely lost from the age of Hippocrates until the last century). The latter accident, as well as fracture of the clavicle, was treated very judiciously and simply, and in fracture Hippocrates (according to Albert) even lays stress upon simplicity in dressing. Other surgical remedies were bandages, poultices, plasters, ointments, styptics, caustic (even shoe-blacking[2] was thus employed), cold and compression, suppositories, pessaries, enemata, cupping etc. The rudiments of orthopædic surgery are also to be found in Hippocrates, who treats club-foot with suitable manipulations, bandages, and proper shoes. (Kroner.) It may be remarked in passing that illustrations of bandaging, extracting darts etc., are to be found in works of art of the 4th and 5th centuries B. C.

The Ophthalmology of Hippocrates refers most diseases of the eyes to the descent of injurious humors from the brain (catarrh) into the eyes. It was limited to an acquaintance with the external and manifest disorders of the eye, tumors, blenorrhœa, ectropium, entropium, epidemic inflammations, styes, gray (senile) cataract, which he calls glaucoma etc. Visual troubles like amblyopia were also indicated, and a few operations, like e. g. that for the relief of trichiasis, were known. What nice observations Hippocrates had made may be judged from the fact that he was acquainted with blindness due to wounds of the supraorbital nerve. "In wounds of the eyebrows and somewhat higher up the sight becomes darkened. As long as the wound is fresh more or less sight is preserved, but the longer the cicatrix persists, so much the blinder the patients become." According to Hippocrates, the vitreous body and the lens were the proper organs of sight. (Magnus.)

Obstetrical science discussed the position of the parturient woman (kneeling in bed, or sitting upon the labor-stool); adhesion and deliverance of the placenta (the child, still attached by the cord, was laid upon a bladder filled with water, and the bladder was then punctured, in order that the delivery of the placenta might take place without violence, as the result of the gradual evacuation of the bladder); the position of the child (presentation of the head was normal; that of the pelvic extremity was dangerous to both mother and child; hence cephalic version was exclusively recommended, though no practical method for its accomplishment was given.)

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[1] Æschylus, who was older than Hippocrates, introduces the same climax in his "Agamemnon"; "What is lacking in the physician and drugs, I will then destroy utterly with the knife and fire", so that this famous aphorism is pre-Hippocratic. (It will also be found in Indian medicine. See page 45. H.)

[2] Melanteria (μελαντηρίη). It was employed as an application to hæmorrhoidal tumors, and is mentioned also by Dioscorides and Galen. (H.)

Hippocrates assumes that the "*culbute*" of the French is completed by the 7th month. He discusses the death of the child, its viability (in the seventh month); the change in the os uteri during pregnancy; abortion and its artificial induction, which the Hippocratists, however, (in opposition to Greek ideas) rejected, and therein proved themselves good physicians. For the production of abortion numerous methods are given: among them the tampon and the following very ingenious one: to leap up with both feet, and at each spring to strike against the buttocks with the heels until abortion ensues. This was prescribed with the desired result for an amorous and much loved singer, "who, as such, had much intercourse (professional virtues were the same then as to-day!) with men." The opening of the cranial cavity (by means of suitable instruments), amputation of the extremities, opening of the thorax and abdomen of the child, and its extraction by means of a hook, are also described. Monstrosities, the altered countenance of the pregnant woman (with male children supposed to be red), were known, and it was held that the fœtus during pregnancy sucked upon the cotyledons, organs, which, from the observation of the lower animals, were singularly enough transferred to the human being, although human placentæ could be had every day. If menstruation continues during pregnancy, the fœtus is diseased, and being deprived of the blood, which is designed to serve as its nourishment, abortion ensues. The birth of the child was effected by its own exertions in pushing with its feet against the womb, whereby the head, aided by the weight of the body, ruptured the membranes, and opened the os uteri. Hunger forces the child to this action, since in the later months of pregnancy it is insufficiently nourished. Dead children are unable to bring themselves into the world, and hence their birth is dangerous to the mother—a fatal interchange of cause and effect. Children born during the 8th month Hippocrates considered not viable. Quite modern abuses seem to have been known, e. g. empêcheurs against conception (The Oath), for in general among "the good people of the olden time" sexual intercourse and sexual excesses were much more artfully managed than in our, in many respects comparatively innocent, age. Yet to the honor of the profession be it said, such things were done chiefly by the midwives, who principally practised the obstetric art, while the physicians were only called to the most difficult cases, where the child was dead, "in which then the death of the mother too was almost certain."

In spite of the frequency of artificial abortions at this period—a frequency which depended upon the lawfulness of the operation—and in spite of the observations upon the hatching of eggs, the history of fœtal development was but scantily known. As early as the seventh day all parts of the fœtus were held to be perfectly visible etc.

The knowledge of Gynæcology, like that of the branches mentioned above, was not far advanced. Diseases of the uterus, however, were tolerably well knewn. For hysteria "matrimony as the best cure" was judiciously advised. Singular views, like those held with reference to the "wandering of the uterus" in the body of the sick, prevailed also with respect to

GENERATION.—It was believed that by holding the right testicle one could beget boys; that the male semen penetrated to the female (the mucus secreted by the genital tract), that the female semen for boys originated in the right ovarium, that for girls in the left, so that the sex was preformed in these organs, and the male semen supplied merely the excitation necessary for development. The fruitfulness of women was tested by fumigation of the vagina, the fumes in the most favorable cases penetrating upward even as far as the head etc. The assertion that thin women conceive more easily than fat, small women than large etc., was based upon the observation of nature, while the advice to effect conception during menstruation, as the most favorable time, was the result of a filthy assumption.

We will remark here that the Greeks, even in the time of Hippocrates, were probably in sexual matters the most licentious of all nations, at least if Aristophanes depicts only half the reality. We have reason to believe that pæderasty, amor Lesbicus, hetærism and harlotry prevailed generally among the Greeks, who were in other respects also very human. As respects Pathology it is surprising, in spite of his masterly observation of the special phenomena of disease in general, how few special diseases are distinguished by name. More general conditions, like phthisis, catarrh, dropsy, cynanche etc. were classed together, while the symptoms described point clearly to a knowledge of intermittent fever, puerperal peritonitis, pneumonia, epilepsy, ileus, meningitis, diseases of the kidney (in which the urine deposits a sediment and foams) etc. Hippocrates regards diseases of the skin as mere critical expressions of internal diseases, and employs in their designation for the most part the same names in use at the present day. In his doctrine of catarrh (which continued in vogue for thousands of years down to the time of Schneider) Hippocrates holds that the catarrhal mucus, formed by all the vapors ascending from the whole lower part of the body, becomes condensed in the brain and then flows down again through the ethmoid bone into the lungs, intestines etc. If this theoretical explanation is false, still his emphasizing the importance of catarrhs shows how good a practitioner Hippocrates was. For though catarrhs are stricken out of the general causes of most diseases, lesions of the mucous membranes continue to be, even to-day, the most important and most successful field of professional activity.—In Psychiatry too Hippocrates did not distinguish the different forms of mental disorder strongly from each other, but he yet recognized most of their symptoms. Even delirium tremens was known to the Hippocratists. Indeed in that time, and in fact as early as the days of Homer, very considerable quantities of liquor were drunk on occasions. As an example of a Hippocratic history of disease we may quote the following:

"Angina, which had befallen Aristion, in whom it first began in the tongue: speech unintelligible, tongue red and dry. On the first day a rigor and fever, a red superficial swelling upon the neck and breast of both sides, limbs cold, livid, respiration blowing. Drinks regurgitate through the nose, she cannot swallow. Stools and urine retained. On the fourth day all the symptoms are worse. On the fifth she died as the result of the angina." Most medical histories terminate with the death of the patients—clear evidence that physicians did not deceive themselves as to the limits of medical art. On this account, however, discredit was cast upon Hippocrates, and his art was called the medicine of death. Celsus, on the contrary, thought that Hippocrates needed not, like lesser minds, to cover his failures with silence: for in spite of these he had reputation enough to counterbalance them.

Hippocrates already distinguishes between acute diseases and epidemics.

"Acute diseases are those which the ancients name pleuritis, peri-pneumonia, phrenitis, lethargus, causus, and the other diseases included in these, and in which the fever is, for the most part, a continued one. At periods when no general pestilential disease prevails epidemically, there die of these diseases more than of all other diseases together."

The most brilliant and eternal contribution of Hippocrates to medicine are his therapeutic maxims: "Follow nature"; "The physician is a servant, not a teacher of nature", though also "The physician is a servant of art"; "Natures are the physicians of diseases";[1] "The physician should benefit, or at least not injure."

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[1] By "nature" Hippocrates understands a force in the organism inexplicable to us, but which maintains the body, and which he calls sometimes *τὸ θεῖον*, sometimes *τὸ δαιμόνιον* and sometimes *τὸ ἐνορμῶν*. (Marx.)

In accordance with such convictions (especially the last, which is capable of no arbitrary interpretation), Hippocrates would not forcibly control the course of the disease, but would manage it by observing and awaiting its subsidence, in order to interfere for the first time actively when nature herself gave him the hint. Even during antiquity therefore he was reproached with doing too little in disease,—a charge which certainly redounds to his credit. He desired to do neither too little nor too much. Hence he says: "Timidity indicates incapacity; rashness is evidence of unskilfulness." That Hippocrates was the founder of the method of treatment (that of indications) adapted to the constitution and the kind of disease, has been already mentioned.—In feverish diseases he allowed much drink (ptisan), and withdrew nourishment.

"The more we nourish unhealthy bodies, the more we injure them."—"The sick upon whom the fever seizes with the greatest severity from the very outset, must at once subject themselves to a rigid diet."—Yet he was not prejudiced, nor devoted to a stereotyped system: We should examine also the strength of the sick, to see whether they may be in condition to maintain this spare diet to the crisis of the disease." "Complete abstinence often acts very well, if the strength of the patient can in any way maintain it." "In the application of these rules we must be always mindful of the strength of the patient and of the course of each particular disease, as well as of the constitution and ordinary mode of life with respect to both food and drink." Golden rules!—His fundamental principle was *contraria contrariis opponenda*, and yet *similia similibus*. He regulated the diet very carefully, and indeed was the creator of dietetics for the sick. If, as just mentioned, in acute diseases, he at first withdrew nourishment and selected chiefly liquid articles of food, especially ptisan, in chronic diseases, on the other hand, he adopted a very strengthening plan of treatment and prescribed exercises, bathing, the milk-cure etc. In the beginning and during the height of painful, acute diseases, particularly of the great viscera, the lungs, liver etc., he instituted frequent bleeding in the vicinity of the diseased part and upon the same side, proportioned to the strength of the patient.

In diseases of the upper half of the body he selected the arm, head, neck or tongue as places for bleeding; in those of the lower half, the feet. In febrile diseases he adopted the "moist" treatment, gave an abundance of drinks, and at the period of the crisis discarded medicine, to avoid producing any disturbance. He was fond of purgation, i. e. the use of cathartics and emetics, but did not administer them in acute diseases until the stadium of "coction" made its appearance. He also purged the head and lungs, the former e. g. with hellebore, the latter by shaking the body, metallic remedies etc. This he did especially in acute diseases, where the urine was muddy, but not where it was clear. He also purged the intestines with enemata. Gargles were prescribed in the pharyngeal diseases, which seem to have been so common in that day. In hygienic matters Hippocrates advises one to observe what he tolerates well, and what badly, and to manage accordingly; to labor, rest, sleep, all in their due season; not to eat too little, nor with too absolute regularity, that deviation from the rule may not produce harm; to drink pure spring-water, as well as wine mixed with water more or less, according to the season; occasionally to get a little tipsy, so that accidental excesses may not occasion harm: in fact to get drunk often (a piece of advice which even the disciples of Æsculapius have always cheerfully followed), but also to control the passions etc. Among his numerous remedies (265 have been enumerated, in spite of his constantly emphasizing the assistance of nature), Hippocrates employed chiefly vegetable substances, though drugs derived from the animal kingdom also were not discarded. Some of these remedies were also articles of food, e. g. the flesh of the horse, ass, fox and dog, cabbage-juice, 7 pints of asses' milk as a mild purgative etc. Metallic remedies were also recognized, e. g. copper, alum and lead. He used as "diuretics": radishes, cantharides, squill, asparagus, garlic etc.; as drastics (which, however, he employed very unwillingly), hellebore, euphorbium, colocynth, scammony, the grana Gnidia etc.; as diaphoretics,—sweating was likewise not one of his favorite methods of treatment,—warm water, warm drinks etc.; as narcotics, lettuce, mandragora and lollium (not opium) etc.; as astringents, nut-galls, oak-bark, sanguis draconis etc.; as emetics, a decoction of lentils, vinegar and honey, tickling of the pharynx, hyssop with vinegar and salt etc.; as expectorants, ptisan with oxymel; as corrigents, dried figs etc. To these may be added such external remedies as vesicants, cupping-glasses, poultices etc. It is a striking fact that Hippocrates kept himself almost entirely free from all superstitious and theurgic methods of treatment. He abandoned these to the charlatans. Yet the Greeks at that time had already adopted from the Asiatics the belief in demons!

The anatomical knowledge of Hippocrates was very imperfect, as must naturally have been the case, inasmuch as it was based upon the dissection of animals only. The different parts were not kept distinct enough from each other, but were often interchanged, intermingled and artificially constructed. In detail the bones were best known (cranial sutures, diploë), while misty views alone prevailed with reference to the muscles. On the other hand the intestines were better distinguished. Nerves, sinews and ligaments were confounded together,[1] while as regards the vessels[2] (which contained partly blood and partly pneuma), and especially as to their course, his views were most singularly artificial. He was acquainted with the pericardium, the two ventricles, the thickness of the walls, the muscular nature and internal appearance of the heart; he knew that the left ventricle is empty after death, and he was acquainted with the valves of the great vessels of the heart. He also knew that the auricles do not contract exactly contemporaneously with the ventricles. Four pairs of vessels were assumed, one originating behind from the nucha, a second out of the head behind the ears, the third from the temples, the fourth from the brow. These cross each other partially in their course etc. The brain is regarded as a gland which condenses into mucus the ascending vapors, which then (as said above) flow down through the nose. The kidneys are also glands, connected with the bladder by "veins". The liver is an organ for the preparation of blood and bile, has five lobes and is more vascular than all other parts. The vena cava with several bronchia pass from it to the heart, and one vein goes from it to the spleen. Hippocrates was acquainted with the duodenum, the colon, the mesentery, the seminal vesicles and the rectum, but no clear description of them is given anywhere. The nerves are hollow and convey the spiritus animales throughout the body, an idea which occasioned lively discussion as late as the 17th century.—All this we shall criticise more mildly when we reflect how difficult was the diffusion of correct anatomical views even down to our own century!

Of Physiology in the works of Hippocrates we cannot with propriety speak. Still we may adduce here the facts that it was assumed that the food was cooked in the stomach, which possessed a peculiar warmth, increased by the liver; that the blood is "warm" in the left heart, while in the right it is still "cold"; that the cause of its warmth is the pneuma, received from the air by means of the "cold" lungs etc. Hippocrates' profound comprehension and appreciation of the history of medicine is expressed in the following maxim: "The physician must know what his predecessors have known, if he does not wish to deceive both himself and others."—He recommends as a rule in practice that the physician should win the admiration of his patients, an object to be accomplished particularly by good diagnoses and prognoses: that he should not be too officious, nor roll up his sleeves, like an athlete, when he wishes to bleed or administer an enema—evidence that even the little arts of practice were fully understood even in the days of Hippocrates.

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[1] They were called indiscriminately *νεῦρον* or *τόνος*. (H.)

[2] Both arteries and veins were called *φλέβες*; *ἀρτηρίη* is the trachea. (H.)

The preceding data did not, indeed, originate with Hippocrates and his pupils alone, but are borrowed, partially at all events, from earlier Greek (and apparently foreign — Egyptian) physicians, so that as we assume a Homer before Homer, we must also assume an Hippocrates before Hippocrates. This fact he himself points out by laying stress upon, and demanding respect for "the Ancients." Hippocrates, on the one hand, summed up the knowledge of preceding physicians unknown to us, and on the other added thereto, doubtless, much that was new! In details Hippocrates too is, of course, not exempt from the deficiencies of his age and of his individual mind.

The undying importance of Hippocrates in medicine rests, first of all, not so much upon his enrichment of science with new material (though this honor too is his unquestioned due), as upon the creation of a scientific (lay-) medicine and art; upon the method and really great principles which he introduced for all time into science, and especially into practice. His investigation and determination of the phenomena of disease and of the science of ætiology, and still more his improvement of professional treatment, have also won for him immortal reputation. Hippocrates was above all else a practitioner who desired chiefly not to impose upon his fellow-men with showy discoveries and theories, but to assist them to the utmost of his power. And this he did! Hence his godlike words: "Where is love for art, there is also love toward man"—a maxim which raises him to that genuine humanity which we ascribe to Christianity alone. Hence too his declaration: "Such is my view; others may hold another. The victor in such a strife proves ordinarily only his own lingual dexterity." The latter idea, in like manner, displays so deep an insight into the attainable knowledge of his time, that we cannot sufficiently admire Hippocrates' self-criticism and freedom from prejudice. On the other hand his practical activity supplied to him, as to all great physicians, a fertile soil for the development of the germ of his genius, and we must consider the great, practical doctrines (partly purely intuitive, partly deductive) which he transmitted to posterity for its guidance, the ripe fruit of that development. To his eminently practical bent is to be ascribed also the fact that he created, and specially cultivated, those branches of medicine which are profitable in practice: Semeiology, prognostics, diagnostics, ætiology, symptomatology and therapeutics, and in a much less degree systematic pathology, anatomy etc. Yet he did not create one single name for his pictures of disease! Throughout all his efforts he remains as free as possible from the perplexities of theory. How correct was his judgment in this is shown by the career of his immediate followers, who confined their thoughts less by the fetters of fact and sober observation, and fell into errors which prevailed for centuries, but are now long forgotten. Yet Hippocrates lives and will continue to live, the immortal model of medical thought, and still more of medical practice, so long as medical science itself exists!

Finally, to draw for ourselves a picture of Hippocrates, the man and the author, we should say, to judge from his words, he was a philanthropic physician, philosophically educated, enlightened in religion, and free from superstition, as such very active, probably rather short and stoutly knit. Certainly, from his aphorisms and clinical conversation, we should say he was not without humor and sarcasm. Moreover he was a careful and unprejudiced observer, trusty, circumspect; though not entirely free from enthusiasm, yet without great fancy; he had a high conception of his profession, which was stamped upon his demeanor; he was free from all delusions concerning himself and the bounds placed upon his art by nature.

"Moreover it is not sufficient that we do what is proper for the case and the time, but the sick themselves and their attendants must do the same, and the circumstances must be suited to the object in view."

As a writer Hippocrates is distinguished by the simplicity, force and precision of his expressions, which not infrequently display an oracular brevity and a dramatic pathos. He has always the right word at his disposal, and not infrequently he constructs for himself new compounds when he is describing his own observations, in which peculiarity he is not unlike Homer. Finally in language he is surpassed by but few Greek writers, and may be classed unhesitatingly among the classical authors of his own, and indeed of all, time!

Moreover he was very well acquainted with mankind, which continues in all ages the same: "The physician visits a patient suffering from fever or a wound and prescribes for him. On the next day, if the patient feels worse, the blame is laid upon the physician: if, on the other hand, he feels better, nature is extolled and the physician reaps no praise." A regard for decency is also inculcated: "One must never strip bare, nor exhibit to the by-standers, without necessity, those parts of the body which should be covered." "One should say something agreeable to the patient, flatter his sense and humor his fancies, if they are not dangerous." Even the rage of physicians and patients for novelties and braggadocio was well known to Hippocrates. No prolonged study is required "to set a broken arm, and any physician is capable of doing this; yet I know certain physicians who create a reputation for dexterity by the unnecessary parade of their manners, a matter which corrupts the public. . . . A novelty, the advantage of which is not known, is praised more than the ordinary method, whose excellence has been proved; and surprising things are more highly prized than those which are obvious in themselves."

Although Hippocrates, as we have seen, exercised upon the medicine of his time an influence so powerful as to give it direction and a name for all future ages, and although he himself enjoyed the greatest respect and reputation, even among his own contemporaries, yet the influence of his principles was surprisingly short. Their decline began almost during his lifetime, and after his death took a very rapid course. This observation would be highly surprising, were it not at once evident that the Hippocratic plan of simple observation and sober appropriation of the facts observed, with the least possible speculation, suited neither the mode of thought nor the spirit of the Grecian people. For the latter was eminently philosophic and theoretic, but by no means unprejudiced, observing or disposed to natural science—a spirit represented in all antiquity by Hippocrates alone.

The connexion of medicine with natural science did not, as Seeger says, increase the respect of the masses for the medical art. Hippocrates laid weight even upon mathematics, and accordingly recommended its study to Thessalus. He calls a philosophic physician, indeed, a godlike man, but he is himself no philosopher in the sense of a definite "school" and doctrine. He is no school philosopher, and thus few traces of the widely extended philosophical doctrines and theories of his time are to be found in his writings. Yet he is a philosopher in his method, in his treatment of subjects, in his investigations of the causes of disease and of the inner connexion of all the phenomena manifested in the human body and in nature.

After his day a philosophy which paid slight respect to all facts and held all observation by the senses to be deceptive, won a controlling influence over medicine. I refer to

6. THE PHILOSOPHY OF PLATO

(B. C. 427-347.),

whose speculative contemplations (Dogmatism), a comprehensive system formed from his own, Socratic, Pythagorean and religious doctrines, assumed two principles, absolute intelligence (godlike reason, God), and matter.[1]

The human soul is an emanation from the former. Its immortal part dwells in the spherical head, which in its form resembles the cosmos, while its mortal part resides in the body, and, indeed, as mind has its seat above the diaphragm in the heart; the lower, sensual part resides beneath the diaphragm in the stomach. Certainty of knowledge depends upon the remembrance of ideas, the pre-existing, innate, supernatural models of all things, but not upon the perceptions of the senses, which supply merely the external appearances. The world is formed of the four elements, which are not indivisible. (Fire consists of pyramidal, earth of cubical, air of octagonal, and water of twenty-sided, atoms.) In addition to these there is also the æther.— Plato, like Pythagoras, laid great weight upon mathematics, which he too had studied especially during his residence of thirteen years in Heliopolis. His teacher was Sechnuphis (Sichnun), a priest of Memphis. Plato was so partial to geometry, that, as is well known, he would receive no scholar who was ignorant of this branch. Everything in the body has in view the spirit. With respect to temporal affairs Plato held quite "modern" ideas. He thought e. g. that the state should assume the regulation of the subject of reproduction, should introduce a kind of community of women, and unite maidens with old men, and young men with older women etc. In fact he was an antique social-democrat, who (in contrast with Aristotle, who laid more emphasis upon the rights of the individual) subordinated everything to the state. Plato too would by his doctrines guard against pauperism and over-population, goblins which even in that day excited apprehension. It may be remarked incidentally that we learn from Plato's "Politics" that the Greek mothers, even of the better classes, suckled their own children, though, says Plato, they should not continue this business too long, but soon take nurses for their children, for fear of becoming too feeble to bear other offsprings.

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[1] How fond the Greeks were of artistic form, even in abstract works, may be inferred from the dramatic form which Plato gave to his writings, clothing them in the dress of dialogues, and stamping them with plastic pictures of the Greek life of his day.

The heart is the origin of the bloodvessels, and, as the seat of the mind, receives through them the commands of the superior soul. The lungs, which receive through the trachea a portion of the drink in addition to the air, serve to cool off the heart. The liver serves the lower desires and for the purpose of divination. The spleen furnishes an abode for the impurities of the blood. The intestine is long and tortuous in order that the food may remain the longer therein, so that the mind may not be disturbed too often in its contemplations by the renewal of nutriment necessitated frequently by greater shortness of the gut. Breathing takes place by inward pressure of the air, for no vacant space can exist in the body (horror vacui). The muscles with the bones serve as a protection to the marrow against heat and cold. The marrow itself consists of triangles, and its most perfect portion is the brain, which generates the semen. Death is occasioned by a separation of the soul from the marrow. Sight originates in a union of the light flowing out of, and into the eyes; hearing, in a shock of the air (correct even now), which is communicated to the brain and the blood, and even to the soul. Taste is due to a solution of sapid atoms by means of small vessels, which latter conduct these from the tongue to the heart and soul; smell, however, possesses no image as its foundation, and is therefore very transitory. Plato considered the uterus a wild beast, which never follows reason, and, through non-satisfaction of its desires, roams about in the body, and also excites inordinate lust etc. Disease originates in a disturbance of both the quantity and quality of the fluids. The most frequent cause of disease is the downflow of mucus and acridity; the most dangerous, is corruption of the marrow. Another cause is the yellow and black bile, through whose aberrations inflammations arise. Continued fever is occasioned by fire, quotidian, by air, tertian, by water, quartan, by earth. Mental diseases are the result of corporeal evils or of bad education. Besides bodily exercise and diet, remedies are formed from drugs, which constitute an opposing treatment for diseases, before which they flee away. Of physicians he says that they must be rulers of the sick in order to cure them, but they must not be money-makers.

In accordance with Plato's partial, speculative and fantastic method was built up the so-called

7. DOGMATIC SCHOOL.

The physicians of this doctrinaire, humoral sect may be called the representatives of the prevalent a priori tendency of Greek medicine: indeed we may regard them as the representatives of a reaction against the analytic portion of the method of Hippocratic medicine. Since their day this alternation of a priori and inductive methods of investigation has constantly recurred in history. The Dogmatists placed reflection above, or rather before, experience: yet they did not reject experience entirely, con-

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1. With respect to hearing he says that we hear with the ears because there is within them a vacant space; for this gives the sound — exactly like Alcmæon.

sidering it, however, simply accessory proof of the correctness of reason. Hence they first sought after the causes of disease; not, however, the actual causes, but those discovered in a speculative way and not based upon preceding observation. They also cultivated a purely a priori method in ætiology. The mucus flowing down from the brain, the different kinds of bile etc. were assumed as the cause of, and the principle of classification for, diseases, and the latter were then formed into classes and named in accordance with the humors adopted in each case. Thus there were mucus diseases, bilious diseases etc., and if one only knew the nature, i. e. the systematic position of a disease, the remedy was easily found—it was one antagonistic to mucus, bile etc. Moreover the physicians of this school, like the similarly reviled philosophical physicians of the 19th century (with whom too they shared a common predilection for certain subjects, e. g. physiology or the history of development—generation of the chick, of man etc.) were not entirely devoid of merit. The appearance of Dogmatic after Hippocratic medicine was the first example of that law of development of the sciences (including medicine), by virtue of which a period of realistic methods of investigation is always followed by another in which the idealistic methods predominate, and conversely.

Of the writings of physicians of this school little but fragments, preserved in the works of other authors, have come down to us. The school itself belongs to the period of the Thirty Years' War of Greece (as the Peloponnesian War is justly called by Jaeger), and to the epoch of rapid decline of Greek life. Its founders were Thessalus (B. C. 380), who lived at the court of the Macedonian king Archelaus; Draco, physician of Queen Roxana, both sons of Hippocrates, and, most important of all, their brother-in-law, Polybus, who, like Thessalus, was author of some of the so-called Hippocratic writings.

The latter enriched the medicine of his day with a knowledge of the egg-membrane and observations upon the hatching of hens' eggs, in support of a more certain basis for the history of development. According to Polybus, the egg-membrane originates in the curdling after coitus of the male and female semen in the bipartite uterus by means of heat, and the formation of a crust, the membrane itself. The sex of the embryo —a problem which, though exceedingly old, has never, even to this day, been solved either theoretically or practically — depends upon the greater strength of one of the two semina. Its growth takes places through attraction of kindred parts and the vital air conveyed to it by the mother. Polybus assumed bile, mucus, blood and water as the causes of disease, while Thessalus claimed only the excess of the two former as such causes, and generalized the down-flow of mucus as the effective agent in the production of catarrhal diseases.

The remaining Dogmatic physicians, even more than those already mentioned, drifted into empty speculations frequently bordering upon the limits of absurdity. Even anatomy, whose importance in the investigation of the causes of disease was so fully understood that they recommended and defended the opening of those who died of disease, and, indeed, of living convicts, was constructed in accordance with theoretical considerations.

The temptation to do this, in consequence of the want of human dissections and the rarity of even the dissection of animals, was very great, and Hippocrates himself had set the example in this respect, as in most other of the views of the Dogmatists. A very curious example of this constructive tendency is found in the doctrine of the "Crossing of the vessels" advanced by Syennesis of Cyprus (about B. C. 360), and the much earlier Diogenes of Apollonia.

The latter physician by reflection even discovered that the embryo originates from the semen of the male alone (Leeuwenhoek 2000 years later taught the same doctrine, mutatis mutandis, but based it upon the microscope), and that, if of the male sex, it is completely formed in five months.

DIOXIPPUS of Cos (B. C. 370)

followed the Platonic doctrine of the partial penetration of drink into the lungs, and sought to uphold this view in defiance of the epiglottis. The latter organ, in his view, separates the grosser portion of the drink from the finer, so that the latter only reaches the lungs, while the former passes on into the stomach. Hence birds, which merely sip water, have no epiglottis. — This view was also maintained by

PHILISTION of LOCRI, a contemporary of Plato,

who occupied himself with anatomy, and explained respiration as a process for cooling the innate heat.

PETRO (or Petronas) is credited with the following Dogmatic treatment of fever. (From the creation to the present day what has not been exacted from the sick!)

At the outset promote perspiration by an abundance of bed-clothes; in the remission drink a quantity of pure water, in order to again excite perspiration. This process he regarded as necessary until the crisis of fever. If under this treatment the crisis did not occur, he then administered salt and water as an emetic, following it up by as much wine as the patient would hold. Petro was also the inventor of sweat-boxes.

The treatment of Acesias[1] was proverbial for its bad results.

EUDOXUS of CNIDOS (B. C. 406–353) studied priestly medicine in Egypt[2] and introduced the Pythagorean doctrine of numbers into the medical art of his time. He was an astronomer, the friend of Plato and the teacher of

CHRYSIPPUS of CNIDOS (B. C. 340),

with whom he spent fifteen months at Heliopolis as a pupil of the priest Chonnuphis, engaged in the study of Egyptian wisdom.

Chrysippus made use of vegetable remedies only, and paved the way for the long prevalent and utter rejection of purgatives and venesection — the latter because, according to Pythagoras (and the Bible), the blood contains the soul, a doctrine of Egyptian origin. In fevers he withdrew all nourishment and administered emetics and enemata, while in hæmorrhage he placed ligatures around the limbs to retain the blood (Esmarch's system ?).

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[1] Acesias was the name of a physician of an unknown age and country, notorious for his want of success. Hence Aristophanes says (Suidas s. v. Acesias) *'Ακεσίας ἰασατο* i. e. "He is getting no better very fast". He must have lived prior to B. C. 400. (H.)

[2] Greek physicians frequently travelled in this country, and thus Egypt gained an ever increasing influence upon Greek education.

Medius, **Aristogenes**, the physician of Antigonus Gonatas, **Metrodorus**, the son-in-law of Aristotle and teacher of Erasistratus, **Phaon**, **Ariston**, **Philetas**, **Pherecydes**, **Acumenes**, **Dionysius** "the Humpbacked", who observed the "Pest", **Hermippus** and **Histomachus**, authors of works on the history of medicine now lost, were all members of the Dogmatic School.

Earlier than these physicians lived Meton of Athens, who sought to combine medicine and mathematics. He computed B. C. 432 that 19 solar years (235 months) made a so-called Metonic period, a calculation subsequently corrected by Hipparchus and Calippus (B. C. 160–125). We may add that Hipparchus utilized the results of Pytheas, a geographical investigator and merchant, who about B. C. 400 made the first (designed) expedition to the north pole, determined the first meridian (of Marseilles), and is the first to mention the Teutons, a people who dwelt around the mouths of the Rhine, and whom he reckons among the Scythians. This Hipparchus of Rhodes (about 160 B. C.) was the first who taught a heliocentric solar system and calculated the solar parallax in order to determine the distance of the sun, while Aristarchus of Samos (about B. C. 280) reckoned the revolution of the earth and moon, and endeavored to determine the former by the moon's phases. He also demonstrated that motion of the earth around the fixed sun was compatible with the endlessness of the world, asserted by Heraclides of Pontus. The Chaldæan Sileucus, of Seleucia on the Tigris, taught about B. C. 160 the heliocentric solar system as a doctrine of his own (Ueberweg).— We bring forward these facts to show the degree of exact education (which was introduced into Alexandria as early as the fifth century B. C. and subsequently attained the grade just described), and still more because it counted physicians as its most eminent representatives.

Diocles of **Carystus** (B. C. 350)

in Eubœa was one of the most famous physicians of antiquity, compared even with Hippocrates himself. He wrote a great number of treatises on fevers, materia medica, poisons, dietetics, anatomical subjects, the history of development etc., and distinguished between pneumonia and pleurisy, as well as dropsies depending upon disease of the liver or spleen, established the differential diagnosis between ileus and colic etc. He interpreted fever as a symptom and held sweating to be unnatural, opposed the views of his predecessors regarding the course of the vessels, demonstrated that the male semen is not foam, since it is heavier than water etc. He also embraced the Pythagorean doctrine of numbers. Other Dogmatists were

Mnesitheus of **Athens**, who wrote on systematic medicine and on dietetics, including the feeding of children ; **Xenophon** of Cos, a follower of Chrysippus in regard to ligation of the limbs ; **Dieuches**, who, on the other hand, discussed the cabbage ; **Plistonicus**, who wrote upon food ; and **Philotimus**, a good anatomist. The latter physicians, together with **Lysimachus**, were pupils of

Praxagoras of Cos (about B. C. 335), the son of Nikarchus, and teacher of Herophilus.

Praxagoras has acquired immortal fame by his discovery of the distinction between arteries and veins, of which the former were the active agents in the formation of the pulse. Under ordinary circumstances they contain air only, but in the case of wounds blood is also found in them, having been drawn in from all the surrounding parts. He considered respiration an action designed to strengthen the heart by forcing air into that organ; the brain was a mere dependence of the spinal cord, but the heart was the origin of the nerves. Praxagoras was a Humorist of the purest water, and as such assumed no less than eleven humors: the sweet, uniformly mixed, vitreous, acid, salt, salty, bitter, pungent, fixed, leek-green and yellow. He sought the source of fever in the great vena cava, and called attention to the differences of the pulse in conditions of health and disease. He practised taxis in every possible way in cases of strangulated hernia, and even performed (though this is difficult to decide) the operations of herniotomy (at least in "iliac passion" he recommends cutting into the abdomen, removing the fæces, and then sewing it up again) and amputation of the uvula. In therapeutics he favored bleeding, though only before the fifth day in inflammations, employed vegetable remedies almost exclusively, and laid great weight on the diet. In the time of the Dogmatic school originated the prohibition of drink in feverish diseases, the revival of which not many decennia ago cost the life of many typhus patients.

8. ARISTOTLE AND HIS PUPILS.

Aristotle (B. C. 384–321), the teacher of Alexander the Great, was the son of Nicomachus, a physician of Stagira in the vicinity of mount Athos, descended from the family of the Asclepiadæ, and practising at the court of the Macedonian king Amyntas (died B. C. 369), the father of Philip II. (B. C. 383-336). He exercised no such important and immediate influence upon the views of ancient medicine as did Plato, though, on the other hand, during the Middle Ages his authority was held in the highest esteem. He did not, like Plato, call about him a numerous school of followers, yet his great mind supplied for thousands of years the principles of thought and observation, and the material for the extension of all branches of knowledge, but especially of the natural sciences, of which he is considered the creator. He granted to the perceptions of the senses their full rights, and thus opened the way for what may be called Grecian Realism; in opposition to the Idealism of Plato and the Materialism of Democritus he took the road of analysis, and thus exercised undoubtedly a favorable influence upon philosophy. Yet, on the other hand, his influence was prejudicial in awakening an exaggeration of the art of forming conceptions—an art built up by him in a masterly manner only to be corrupted by others into subtlety and artifice. Yet "to estimate the activity of Aristotle, to explain his relation to, and to exhibit his agency in, the formation of the human mind, this is to give the history of all science and art, and to describe the whole political life of the ancients; and such a work would demand a mind like that of Aristotle himself!" In his day, too, Greek culture had already begun its decline, and Hellenic activity in the department of mind lost more and more its creative power, degenerating gradually into a simple pedantry which contented itself with imitation and compilation. The petty jealousies and quarrelsomeness too of the Greeks themselves prepared the way for the incurable wound inflicted by Philip II. of Macedon, and Grecian independence was lost in spite of the patriotic orations of Demosthenes.

Aristotle, the creator of logic, like Plato, assumed five elements as components of the body, and assigned to them three cardinal qualities, form, substance and motion or rest. Experience was the basis of all science; the knowledge of the powers subservient to the soul, the *entelecheia*, was its object. The body is the instrument of the soul, and both body and soul are in essence one and the same. Life is movement; the heart, however, is the seat of warmth, the source of motion, sensibility and desire. It is the "Acropolis of the body".

The investigations of Aristotle in natural science (in aid of which Alexander supplied him with money and material) extended especially over the animal kingdom. He was a famous zoologist and the founder of comparative anatomy. It is only through physiology that he comes into contact with medicine, since pathology, particularly that of man, is only slightly and incidentally considered. He refers diseases to the blood and the humors, through the abundance or lack of which, as the case may be, their differences arise. He made observations on the influence of the weather, the season, the food, drugs etc. On the other hand his labors in anatomy, which he studied in animals, are of great importance. He distinguished the nerves as such, but called them canals of the brain, which latter organ he described as bloodless, and of the largest size in man. Yet by the term "neura" he understands tendons and ligaments, which he thinks originate from the heart. He recognized the optic nerve, but explained the auditory nerve as a "vessel". The common origin of the vessels from the heart is also one of his theses, and he discovered independently the difference between arteries and veins. He gave its name to the aorta, and speaks of the great vena cava. Yet he had totally incorrect views concerning the course of the vessels. Thus one ran from the liver to the right arm, another from the spleen to the left arm; hence venesection upon the side of the organ affected by disease was especially efficacious. He described the ureter correctly, and the organs of sensation inexactly. In his physiology he assumes that vessels, tendons etc., as "homogeneous parts", preside over sensation, while the other "non-homogeneous parts" control motion. Chyle originates in the process of coction in the stomach (pepsis, dyspepsis), and is thence carried into the heart. In his view the blood is the nutritive material designed for the formation, growth and warming of the body, and for the supply of its waste. It is brought to the tissues by the vessels, and in its normal condition is an indifferent fluid which contains neither mucus, bile (either black or yellow), nor water. But in conditions of disease the blood becomes mixed with these extraneous fluids. Water he considers the essence of sight; air that of hearing; water and air, of smell; earth, of feeling; while fire is mixed with either all or none of the senses. All of the senses act by means of a medium, e. g. sight by light.[1] Sleep is a restrained energy of sensation, with unrestrained capacity therefor. In respiration the pneuma, which serves for the purpose of cooling, passes through the trachea into the heart. The semen is the noblest moisture of the body, and contains a spiritual element; while the testicles serve to retain it, and are also, according to Aristotle, organs for the promotion of chastity. The color of the semen, even in negroes, is white. Generation is due to an intermixture of the male semen with the menstrual blood, which latter is then coagulated by the spiritual elements of the semen, and the result is the origin of the embryo. The capacity for fœcundation, with rare exceptions, is closely connected with the existence of the menstrual flow. More than five children can neither be begotten, nor born, at one time. Superfœtation is possible. In embryology (by his observation of hatching eggs), he discovered the *punctum saliens*, and also the vessels proceeding from this point, which latter form the first evidence of development. The heart of the embryo moves, as he saw in hatching eggs, and does not stand still as was believed. He disputed the development of the male embryo in the right, and the female in the left side, and asserted that the fœtus could not respire before it was completely born. Aristotle emphasizes the necessity and advantage to the physician of a knowledge of the natural sciences. "It is the business of the naturalist to know also the causes of health and disease. Hence most naturalists see in medicine the conclusion of their studies; and of physicians, those at least who display some scientific knowledge in the practice of their art begin the study of medicine with the natural sciences"—quite modern ideas! He also emphasizes the fact that the better class of physicians lay great weight upon anatomy. Yet in spite of his nice knowledge of nature, Aristotle was not free from the superstition of his age, and was a believer in dreams, the happy significance of a sneeze, chiromancy etc.

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[1] The first intimation of the undulatory theory is ascribed to Aristotle.

A pupil, and the successor, of Aristotle in the Lyceum, was the learned THEOPHRASTUS (properly Tyrtamus) of Eresus, in Lesbos (B. C. 372–285).

He is of especial importance as the first botanist, and described 500 plants, partially from his own observation in travelling, and partially (especially the foreign species), from the reports of merchants. Moreover he instituted experiments upon the sense of smell, and wrote on this subject, as well as upon sweating, vertigo, fainting, palsy etc. In like manner with his book "On Stones" (*Περὶ λίθων*) he was the founder of the department of mineralogy, or rather the first "mineralogist." For weakness of sight, or rather to strengthen the eyes, according to Theophrastus (and Pliny makes the same statement), emerald seal rings were worn, "in order to strengthen the sight by their aspect." (Magnus.) In this work he makes mention too of quicksilver.

After him Strato, of Lampsacus in Mysia (B. C. 280), was President of the Lyceum and teacher of Ptolemy Philadelphus of Alexandria. He likewise wrote on special sensations, as well as on diseases, growth, generation etc.

Other Peripatetics, like Lycon of Troas (a physiologist between B. C. 269 and 226), the successor of Strato, Eudemus of Rhodes (B. C. 260), Menon, Clearchus and Callisthenes (died about B. C. 326), a kinsman of Aristotle, famous for his tragic death occasioned by his own candor, occupied themselves also with medical matters.

9. THE SCHOOL OF ALEXANDRIA,

which comprises the followers of Herophilus, Erasistratus and the Empirics, was a late bloom of the Grecian spirit cultivated upon the soil of the ancient Pharaohs by the ostentatious and luxurious Ptolemies (233–30 B. C.), the successors of Alexander in Egypt.

The latter kingdom at this period contained 30,000 towns, with seven millions of inhabitants, and, as the mistress of the commerce of the world, possessed immense wealth.

The patronage of Alexander's generals,[1] now elevated to the position of kings, who, in order to confer lustre upon their thrones, condescended to take an interest in the sciences, was the sun to whose artificial beams this intellectual bloom was due. Yet for these rulers the sciences were, for the most part, merely a new kind of luxury or a pastime, as they were at a later period with Louis XIV. and his imitators. The favor and fancy of princes at this time, however, acted with exceptional permanency upon science by supplying to men of genius, who would otherwise have probably died inactive, the means, the occasion and the leisure for their labors. This is especially true of human anatomy. At this period, for the first time in all antiquity, were human bodies, in spite of the prejudice of the Greeks and still more of the Egyptians against such "godless" proceedings, freely placed at the disposition of investigation. But that living men, as seems proven, were also dissected at that time by the representatives of science (in order to search out the seat of the soul and the origin of disease), we must declare a lamentable cruelty, unpardonable even to an excess of scientific zeal. As little can we excuse the regular annual repetition of animal vivisections, already performed a hundred times, and practised to-day in illustration of lectures designed to demonstrate anew phenomena already a hundred times demonstrated, as well as to show our modern precision and the dexterity of the experimenter.

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[1] A short time before the death of Alexander there broke out in his army an epidemic skin-disease, which has been by some considered small-pox.

Taken all in all the intellectual culture of the Alexandrians was rather extensive than intensive; one which devoted its energies less to original and creative intellectual labor, than to explanation, criticism and elaboration of the labors of others, and especially of the works of Hippocrates. This tendency favored the origin of scholastic and learned opinions, to be attacked and defended with equal obstinacy, and promoted the growth of those "schools", which were the natural result of these disputes. From the intimate contact of the Alexandrians with the Orientals, their tendency to refinements and dialectics, which had always suited the Grecian mind, throve with considerably more vigor than among the ancient Greeks. "The latter had brought all the proper arts to perfection, and no intellectual activity possible without erudition, without immense wealth, and without other encouragement than that supplied by their own enthusiasm, had been foreign to them. On the other hand, everything useful, elegant and brilliant, which owes its creation simply to the favor of a government, and to external support and encouragement, is the work of the Ptolemies and their age. The condition of the arts at the time of these rulers furnishes about the measure of that which later antiquity had attained, and in a few branches only did the Romans make a still further advance. (Schlosser). It was the practical sciences, whose bloom in the life of the people ever corresponds with the summit of their culture (or rather with the decline which speedily follows the attainment of this summit), and usually for a considerable time maintains this elevation—it was, I say, the practical sciences which now occupied the foreground. The chief fame of the Alexandrians is based upon mathematics, astronomy, mechanics, architecture, ship-building, commerce and trade. To these we may add bibliography, for which special institutions existed with the design of facilitating the replenishment of magnificent libraries. The cultivation of the natural sciences, botany and pharmacology, zoology etc., was closely related to medicine. For the former as well as the latter, and particularly for anatomy, there existed great collections or museums. In short this was an age, which in many respects resembled that of the Roman emperors and our own day. It showed its proper productiveness only in the natural sciences, mechanics and medicine, branches in which a high creative power may be dispensed with, and may be replaced by an intellectual force founded upon observation by means of the senses, quite in contrast with the arts and higher mental sciences. (Schlosser.)

The Alexandrians were partly commentators and compilers, and partly independent workers. They also corrupted and falsified many writings of the earlier authors. Their educational institutions were the "Museum" in the Bruchium, which was closed by the outrageous Caracalla (A. D. 188–217), and the "Serapeum", the former situated in the eastern, the latter in the western part of Alexandria. The Museum was founded by Ptolemy Philadelphus, the Serapeum by Ptolemy Soter. Both contained large libraries, which the Ptolemies, in emulation of the kings of Pergamus, increased until they are said to have contained 700,000 rolls of papyrus. The library of the Museum was thrice consumed by fire, viz. in B. C. 47, and A. D. 390 and 632;[1] that of the Serapeum was destroyed A. D. 391 at the instigation of the fanatical Christian bishop Theophilus. The scientific treasures amassed in these edifices consisted, however, not of books only, but also of collections of every kind, especially anatomical, zoological, botanical preparations, and mechanical apparatus, all of which were open, in the most liberal manner, to the disposition of both teachers and students.

In consequence of her preference for the departments of natural science Alexandria was, even far into the Middle Ages, the special school for their study. Indeed from her walls a knowledge of these branches was spread abroad to the Arabians in the East, so that "The University of Alexandria" was regarded as the most important of all the educational institutions of the Ancients. In later Roman and early mediæval times, the study of medicine in Alexandria, as Ammianus Marcellinus remarks, was a great recommendation—as great as when a physician of the present day can say that he has studied in Vienna, Paris or London, though it may be that he was chiefly occupied with very different matters from medicine while in those cities.[2] Medicine, botany, physics and mathematics were especially cultivated here. Both teachers and scholars dwelt in the institution, or in its vicinity. The former received high salaries and a free residence, and many students also had their residence and maintenance free of all expense. Here met and mingled Greeks, Egyptians and Jews, in a manner totally unlike that of any scientific institution of ancient times. Hence this university, alone among those of all antiquity, received, almost from the outset, an international character, and educated the most physicians of all the ancient schools.

The Museum contained also (in imitation of the Egyptian temples) places for prescribing for the sick, a sort of clinic for out-patients.

To belong to the Museum, or to be from the Museum, had as great a charm for the savants of that day, and rendered them as conscious of their own importance, as our titles "Fellow of the Academy of Sciences" etc. have upon our professors of the present day. (Schlosser.)

This epoch which, when compared with the preceding dogmatic tendency of medicine, must be regarded as an epoch of realism, or rather an

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1. The Museum was first burned during the struggle between Cæsar and Pompey, by an extension of the flames from Cæsar's fleet. It was probably restored by Cleopatra, and is said to have been again destroyed during a revolt which broke out in the reign of Gallienus, about A. D. 265. I know nothing of any calamity to the Museum A. D. 390, unless the author supposes it to have shared the fate of the Serapeum noticed in the text. The date A. D. 632 evidently refers to the destruction of the library by the Saracens, which, however, Gibbon places in 640. (H.)

2. Ammianus Marcellinus, who wrote about A. D. 378, says: "Again of medicine, the aid of which in our present extravagant and luxurious way of life is incessantly required, the study is carried on with daily increasing eagerness; so that while the employment be of itself creditable, it is sufficient as a recommendation for any medical man to be able to say that he was educated at Alexandria. And this is enough to say on this subject." (H.)

epoch of realistic reaction against Dogmatism,[1] was distinguished by the appearance of the famous founder of human anatomy, a physician compared by antiquity with Hippocrates himself:

HEROPHILUS of CHALCEDON (about 335–280 B. C.). A pupil of Praxagoras of Cos, ordinary physician of Ptolemy Soter (B. C. 323–284), and the teacher of Agnodice (who practised midwifery in Athens under the same difficulties at the hands of her male colleagues as those which meet our doctresses at the present day), Herophilus inherited from Praxagoras a predilection for anatomical investigation, and pursued his studies upon human corpses and even upon the living bodies of convicts. — A contemporary of Herophilus, and a physician valued no less highly in all antiquity, was

ERASISTRATUS of IULIS on the island of Ceos, one of the Cyclades. His teachers were Chrysippus of Cnidos, Metrodorus and Theophrastus. At first he was a simple practitioner and acquired great reputation by his diagnosis and treatment in the case of Antiochus I. Soter (B. C. 281–262), the son of Seleucus Nicator (B. C. 312–281). Antiochus had fallen desperately in love with his step-mother Stratonice, and Erasistratus, who was the ordinary physician of king Seleucus, recognized the cause of the prince's illness by his palpitation, trembling, perspiration and blushing on the entrance of that lady, and cured him by the homœopathic treatment of matrimony with the object of his desire. His success was rewarded with a fee of 100 talents (about $100,000). Subsequently Erasistratus lived in Alexandria as ordinary physician of Ptolemy Philadelphus (B. C. 284–246), a sovereign of great scientific importance in the history of that city. Erasistratus died about B. C. 280 and was buried near the mountain Mycale, opposite Samos.

From the doctrines of each of these physicians, who belonged to the golden age of Alexandrian erudition, but of whose teachings very little has been preserved to us, descended a school, which survived to a late period — that of the Herophilists until about A. D. 100, and that of the followers of Erasistratus until about A. D. 200. They fought with learned pertinacity to the very end.

To mark the doctrines of their founders we place them here in contrast with each other.

Herophilus.	**Erasistratus.**
ANATOMY AND PHYSIOLOGY.	ANATOMY AND PHYSIOLOGY.
Knew the nerves; ascribed to them capacity for sensation; divided them into those subject to the will, and those which extend from bone to bone, which latter are not controlled by the will (confusion with ligaments). He derived the nerves from the brain, in which he discovered the calamus scriptorius, the	Divided the nerves into those of sensation and those of motion, the former of which arise from the brain substance, the latter from the membranes. He also, however, confounded nerves and ligaments. As regards the brain, he described accurately its structure, convolutions and ventricles. He regarded the

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[1] It might also be called, without much error, the epoch of antique scientific or exact medicine.

tela choroïdea, the venous sinuses and the torcular Herophili. According to him the fourth cerebral ventricle is the seat of the soul.	convolutions of the cerebrum, and still more of the cerebellum, as the seat of thought, and located mental diseases in the brain. The development of the embryo takes place by new formation (epigenesis).
He discovered the chyliferous and lymphatic vessels. Described accurately the liver, Fallopian tubes, epididymis, duodenum (to which he gave its name), and also the os hyoides, the uvea, the vitreous humor, the retina, and the ciliary processes. He called the pulmonary artery the vena arteriosa, and the pulmonary vein the arteria venosa, and knew that the left spermatic vein sometimes originated from the renal.	Knew the lymph and chyle vessels, and gave as their contents air and milk alternately. Named the parenchyma of the liver, whose invisible canals discharge the bile, the trachea (heretofore called "arteria"), the valve of the vena cava (valvula trichlogyna), the chordæ tendineæ of the heart. The latter organ, according to him, contains no blood, an idea which Galen refuted by puncturing its walls. Theoretically he assumed anastomoses of the arteries and veins, which, however, normally terminate in closed extremities opposite each other.
He distinguished in respiration a systole, a diastole, and a period of rest, the last of which arises from the desire to both expire and inspire. The vessels receive pneuma from the lungs and the skin (perspiration?).	Respiration is the introduction of pneuma, which at first goes into the pulmonary veins, and thence through the heart into the bloodless arteries. This pneuma in the heart is vital spirits, in the brain animal spirits.
He founded the doctrine of the pulse (rythm, the bounding pulse, varieties according to age). The pulse is communicated by the heart to the walls of the arteries. He distinguishes between arteries and veins, and admits that the former contain blood.	The influx of the pneuma into the arteries occasions their dilatation and thus the pulse, which is a passive process propagated from the heart. The arteries contain simple air. Digestion takes place through friction of the walls of the stomach (Iatro-physician!); nutrition, by the addition of new particles; secretion by the non-attractive force. The bile is useless; likewise the spleen and other viscera. Drinks do not enter the air passages. He shows traces of pathological anatomy: induration of the liver in dropsy.
ÆTIOLOGY.	ÆTIOLOGY.
Diseases originate in a corruption of the humors. Paralysis is due to a lack of influence of the nervous force. Sudden death depends upon paralysis of the heart. He laid little weight upon Ætiology, but much more upon Symptomatology.	The chief cause of disease is plethora and aberration of the humors (*error loci*): in fevers in the larger, in inflammation in the smaller arteries. Inflammation arises when the blood is detained in the small vessels by the pneuma driven from the heart into the arteries: fever occurs when the pneuma is crowded back to the heart by the venous blood, and blood gets into the large arteries. Dropsy always pro-

	ceeds from the liver. Paralysis is due to an aberration of the moisture which nourishes the nerves of motion.
Semeiology. Herophilus divided this science into Diagnosis, Prognosis and Anamnesis.[1]	**Semeiology.** Critical evacuations can be distinguished from those which are injurious with great difficulty only.
Therapeutics. Herophilus followed in part Hippocrates; laid great stress upon diet; bled frequently; used freely compound and so-called specific remedies. In hæmorrhage he practised ligation of the limbs, and was the first to administer cooking-salt (a remedy, as we know, still given to-day without effect in hæmoptysis). He was a friend of much medication.	**Therapeutics.** Erasistratus rejected Hippocrates, and, like Chrysippus, utterly discarded bleeding, as well as purgation; recommended baths, enemata, emetics, friction, cupping, temperance of life, ligation of the limbs to close the anastomosing vessels, which in hæmorrhage are open. Was a forerunner of Hahnemann in his acceptance of the powerful effects of the smallest doses of medicine: three drops of wine was a very beneficial drink in bilious diarrhœa.
Pharmacology. He preferred vegetable remedies, and was a good botanist. He designated remedies as "Hands of the gods."	
Surgery. Herophilus likewise cultivated especially the treatment of ulcers.	**Surgery.** Erasistratus discarded paracentesis abdominis; opened the abdomen to apply remedies directly to the affected spot; invented a kind of catheter.[2] In order to explain hæmorrhage during surgical operations, he supposes that the pneuma first escapes out of the arteries, and is then replaced by venous blood, so that no bleeding arises from the bloodless arteries.
Obstetrics. He knew the changes of the portio vaginalis in pregnancy, and regarded menstruation as necessary to pregnancy and to health. Difficult labors arise from transverse position, incomplete dilatation of the cervix, non-rupture of the membranes, inertia uteri, death of the fœtus, hæmorrhage, tumors etc.	

It is easy to understand that such differences of doctrine, rude in themselves, and still more rudely defended, afforded abundant opportunities for learned disputes and the foundation of "schools", and that these opportunities might easily continue to exist in an age of erudition and artificiality. To this was added too the superabundance of physicians, a condition which always favors specialism in practice, and which was far more marked in this age than in the classical period proper. Among this class of specialists the lithotomists were prominent, and among these again the name of

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[1] Remembrance or recollection of what has occurred. (H.)

[2] The catheter was employed as early as the age of the Hippocratists. The instrument of Erasistratus was shaped like the Roman S. (H.)

AMMONIUS of ALEXANDRIA (about B. C. 230) deserves special notice.[1] The lithotomists, or some of them at least, degraded their art by the most infamous practices.[2]—At this period medicine was divided more decidedly than heretofore into Pharmacy, Surgery and Dietetics (medicine proper).[3]

a. The **Herophilists** (B. C. 290 to about A. D. 100), who in later times fell into subtile refinements, particularly with reference to the pulse, had their original headquarters at Alexandria. After the expulsion of the literati, however, by Ptolemy Physcon (B. C. 145–117), they took refuge at Laodicea. Among the earlier of them belong

EUDEMUS the ANATOMIST (B. C. 290),

who described the bones, the nerves, the brain and the fringes of the Fallopian tubes;

DEMETRIUS of APAMEA IN CILICIA (B. C. 276),

who named and described diabetes, but was especially distinguished as an obstetrician. He divided hæmorrhages into those arising from an injury of the vessels, and those which have their origin in atony, "anastomosis" or simple exudation of blood, without any lesion of the vessels, but simply as the result of thinness of the blood or of the vascular walls. Dropsy he divided inaccurately into tympanites and ascites. He cultivated pharmacology and particularly obstetrics, in which latter department he ascribed difficult labor to abnormities of the fœtus, the passages, or to the condition of the womb, (excessive size of the head or of the other parts, false position, death and emphysema of the fœtus, small pelvis, diseases of the womb, mental and physical disturbances etc). In the normal position the head was downward, the arms on the thighs, or the feet down. Abnormal positions were the presentation of one or both hands, or the existence of wrong rotation of the head.

CALLIANAX (B. C. 270),

notorious for his harshness ([4]);

BACCHIUS (B. C. 264),

who wrote commentaries upon Hippocrates, mentioned four causes of hæmorrhage: laceration, suppuration, anastomosis and exudation (the latter the chief). and declared that the pulse originated in the whole body, a doctrine violently opposed by the partisans of Erasistratus;

CHRYSERMUS,

who considered the pulse a function of the arteries alone, and entirely excluded the heart from its formation;

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1. He invented a kind of lithotrite. (H.)
2. Antiochus VI., of Syria, was murdered, at the instigation of Tryphon, by the lithotomists in a pretended operation for stone (B. C. 143). (H.)
3. That, even as early as the age of Herodotus, Greek physicians divided medicine into specialties, may be inferred from the expression of that author, in which he says that the Egyptians "also" divided up the medical art, the "also" of course implying that the Greeks did likewise.
4. To a patient, who lamented that he must die, Callianax replied shortly: "Patroclus, too, must die". Simon, of Alexandria, who wrote on the diseases of women, lived before Callianax.

MANTIAS (B. C. 250),
who was a cultivator of pharmacology. pharmacy and bandaging. He was the first who collected the preparations of drugs into a special book.

CYDIAS of MYLASA IN CARIA (B. C. 250)
wrote commentaries on Hippocrates.

CALLIMACHUS (B. C. 246)
likewise wrote commentaries on Hippocrates.

HERACLIDES of ERYTHRÆA IN BŒOTIA (B. C. 230),
a pupil of Chrysermus, who elaborated the doctrine of the pulse.

ANDREAS of CARYSTUS (B. C. 210)
wrote on the history of medicine, pharmacology, adulterations of opium, invented bandages and described rabies canina and pantophobia as special diseases.

AGATHARCHIDES (B. C. 170)
described the dracunculus.

ZENO of LAODICEA (B. C. 210)
wrote commentaries upon Hippocrates, regarded the heart as appendage to the arteries, and explained the pulse by an alternate contraction and dilatation of the latter. He also invented some compound remedies.

ZEUXIS,
who wrote commentaries upon Hippocrates, also founded a special school at Laodicea,[1] to which belonged:

DIOSCORIDES PHACAS (about B. C. 40),
physician of Cleopatra and author of 24 books on medicine;

ALEXANDER PHILALETHES (A. D. 20),
who made some subtle definitions of the pulse, to which

DEMOSTHENES PHILALETHES (under Nero),
the famous physician of Marseilles, subscribed with few alterations. The latter was the most celebrated oculist of his time, and his work on diseases of the eye (now lost) was the authority upon this subject until about A. D. 1000. The use of the term hypochysis for cataract (instead of the glaucoma of Hippocrates), originated with this school, though it was probably borrowed from the Egyptians.

ARISTOXENES (A. D. 79)
devoted himself to the pulse and pharmacology.

APOLLONIUS MYS, APOLLONIUS THER of TYRE
and others also belong among the later Herophilists.

To the followers of

b. **Erasistratus,** whose school continued from B. C. 280 to about A. D. 200, belong:

STRATO of BERYTUS IN CŒLE-SYRIA (B. C. 280),
who wrote commentaries on Hippocrates and discarded venesection because of the difficulty of distinguishing between arteries and veins. One of his pupils was Apollonius Stratonicus:

XENOPHON of COS (about B. C. 290)
lived before Apollonius of Memphis (B. C. 250), and wrote on botany, the pulse, medicines and diseases of women. He regarded the departure of worms from the body a dangerous sign in diseases.

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[1] Zeuxis flourished probably about B. C. 50. (H.)

Apollophanes (B. C. 260)

was physician of Antiochus the Great (B. C. 222-186);

Nicias of Miletus (about B. C. 280),

a friend of Theocritus, the inventor of the idyl, the only new species of poetry of the Alexandrian age;

Chrysippus (between B. C. 294 and 200),

as well as his contemporaries

Artemidorus, Hermogenes, Apollonius, Miltiades

(the last two writers upon the diseases of women) and Apemantus, an opponent of venesection, are regarded as partisans of Erasistratus.

A special school, whose principles were opposed to all bleeding, was founded by Hicesius of Smyrna (B. C. 30). Ptolemaeus and Menodorus, the friend of Hicesius.

They cultivated pharmacology and dietetics. To this school — though the period of the physicians of this (age of schools) and their precise distribution are not infrequently uncertain — belong also

Philoxenus (about B. C. 260),

a famous surgeon, and author of a surgical text-book now lost, and the far later

Martialis (A. D. 150),

who cultivated anatomy. The following physicians and surgeons of the Alexandrian period should also be mentioned:

Demetrius of Bithynia,

an eminent physician; Sostratus, Nymphodorus and Nileus (all about B. C. 260); Evelpistus, Tryphon (son of Sidon), Amyntas of Rhodes, the famous Pascrates; Perigenes (the three latter between B. C. 60 and 30), and others, who devoted their energies to the invention of machines, bandages etc. to which they gave curious names; while a few rendered service to the study of hernia, as e. g.

Heron,

an Alexandrian mathematician, physicist and physician, a contemporary of Archimedes of Syracuse (born about B. C. 287), and the describer of the water-organ invented by his teacher Ctesibius[1]. Heron lived about B. C. 250, and his memory is preserved in medicine down to the present day by an invention (Heron's pad). He also discussed umbilical hernia, enterocele and epiplocele, while

Gorgias

proved that umbilical hernia might contain simple air etc.

The disciples of Herophilus and Erasistratus fell more and more into the discussion of empty subtilties — and so the aid afforded by the

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[1] An instrument in which air was driven into flute-like tubes by a stream of water. It was played something like our orchestrion. It may be remarked here that (according to Nohl) the serious music of the ancient Greeks had degenerated even in the Alexandrian period into virtuosoship, and brilliant effects were sought by the employment of numbers. Ptolemy Philadelphus e. g. presented 600 musicians, including 300 singers who played upon the cithara. Among the Romans this tendency was carried still further, and in Cæsar's time on one occasion 1200 singers and musicians performed together in Rome, a phenomenon again witnessed in our day. The Greek musical notation was transmitted to us by the Alexandrian Alypius, about B. C. 360.

Ptolemies to the advancement of science bore no fruit of importance, if we except from this judgment anatomy, and perhaps materia medica.

As the schools already mentioned may be ascribed to the influence of Aristotle, so the third Alexandrian school,

c. **The School of Empirics** (B. C. 280 to about A. D. 117), was especially due to the influence of the skeptics. Skepticism, inaugurated by Pyrrho of Elis (B. C. 376–288), was introduced by Ænesidemus[1] into the medicine of the Empirics, who assumed originally the title of Teretics, or Mnemoneutics, and only at a later period took that of Empirics.

This school (if we except that of Hippocrates) undoubtedly defended the best principles, and is of great importance in the development of the methods of medical investigation and treatment. The Empirics rejected as useless all search after the causes of disease, and all knowledge of anatomy—certainly a grave mistake — but, on the other hand, laid the greatest weight upon experience. The foundations of the latter were accident, history (the remembrance of earlier cases and anamnesis), and the application of similar cases (analogy), which together composed the so-called "Empiric tripod". In new diseases there was added thereto invention, which, as practical experience, in so far as it was awakened by earlier experience, formed a fourth category. They rejected all à priori reasoning, and had recourse to the so-called hypotyposes (i. e. definitions, in which no attention was paid to the hidden causes), as well as to "nominal, instead of real, definitions", and to the epilogism (i. e. a knowledge of the causes of disease acquired from actual observation), by which all fruitless antecedent reasoning was cut off. If e. g. a person has become insane, and a scar is also found upon his head, one infers from the latter the hidden exciting cause of the disease, the wound of the head. The Empirics also discarded the doctrine of indications. They wished only to cure the patient—an undeniably practical aim—and thus to fulfil the highest duty of medicine, which is not aided by fine-spun theories. According to their views, disease is a coincidence of accidents, which always concur in the human body in the same way, and whose number is of the greatest importance, since from a single accident one can seldom judge of diseases, and determine their treatment. For the latter purpose the addition of more recent cases, the time and the order of their occurrence are also of controlling importance.

The founder of the School of Empirics, whose aim was opposition to the absolute rule of the Dogmatism of that period, was

PHILINUS of Cos (B. C. 280),

a pupil of Herophilus, and a commentator on the writings of Hippocrates. He discarded all dogmas and laid weight upon autopsy[2] alone, a term which became subsequently the shibboleth of the Empiric sect, and is again met with in the 17th century and the pathological schools of the 19th. Yet Philinus declared that the anatomical knowledge which he had acquired from Herophilus had not, as such, helped him at all in the cure of the sick. His successor, however,

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[1] Ænesidemus was a native of Crete who flourished at Alexandria probably about B. C. 40. He wrote eight books in defence of the doctrines of Pyrrho. (H.)

[2] It should be remarked, however, that the Empirics employed the term autopsia in its strictly etymological sense to designate personal observation, and not as synonomous with autopsia cadaverica or post mortem examination, as the term is very frequently employed at the present day. (H.)

SERAPION of ALEXANDRIA (B. C. 270),

from his importance in the school was also styled its second founder. He was always at war with Hippocrates, and gave vogue to several curious remedies, e. g. the testicles of the wild boar in epilepsy. He likewise recommended sulphur in chronic diseases of the skin, the heart of the hare, turtle's blood and — crocodile's dung. The latter through his influence is said to have acquired a very high price. Serapion wished to discard all hypotheses and to avoid all wrangling. He lived about the period of the greatest scientific activity in Alexandria, under Ptolemy Euergetes (B. C. 246–221), who authorized the translation of the Bible known as the Septuagint.

GLAUCIAS (B. C. 260)

wrote a collection of alphabetical commentaries upon Hippocrates, with the design of proving him a supporter of the Empirics. He was likewise the inventor of the "Empiric tripod", and prided himself greatly upon his invention.

ZEUXIS the Empiric (B. C. 250)

was also an eminent physician.

HERACLIDES of TARENTUM (B. C. 240),

a pupil of Mantias the Herophilist, was the most distinguished of the Empirics, and wrote extensive commentaries upon Hippocrates, with treatises on the cure of internal diseases, pharmacy, food, the pulse etc. He employed opium internally to procure sleep, and treated "phrenitis" in a darkened chamber, with daily enemata, venesection, and poultices to the head. He likewise occupied himself with the cosmetic art and the study of poisons, and mentions the strangulation of hernia.

APOLLONIUS "the EMPIRIC" (about B. C. 230) and

APOLLONIUS BIBLAS (B. C. 230–200)

wrote commentaries upon the writings of Hippocrates, and the latter was also the author of treatises upon drugs.

APOLLONIUS of CITTIUM in CYPRUS,

lived much later—about B. C. 50—but likewise wrote commentaries upon Hippocrates with some original treatises. He was a pupil of Zopyrus.

The subjects of medicines and poisons in this day claimed so much interest that even

ATTALUS III. of PERGAMUS[1] IN MYSIA (B. C. 138–133), and MITHRIDATES the GREAT of PONTUS (B. C. 124–64),

occupied themselves with their study, established botanical gardens for this purpose, and experimented with poisons and antidotes. The so-called "Mithridaticum", a highly prized universal antidote esteemed down even to modern times, derived its name from the latter monarch. At this period too lived

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[1] Capital of one of the kingdoms formed from the ruins of the empire of Alexander, and the seat of a university and academy of fine arts (Altar of Pergamus). It was long a rival of Alexandria, especially in regard to its library, which was founded by Eumenes II. (B. C. 197–159). When Ptolemy II. had prohibited the exportation of papyrus, in order to deprive the kings of Pergamus of the material for the increase of their collection of books, parchment is said to have been invented here to take its place. (Baas.)

Pergamus was the birthplace of Galen, and the seat of a very famous Asclepieion, which was visited by Caracalla as late as A. D. 215. (H.)

CLEOPHANTUS (B. C. 138),

who was the teacher of Asclepiades of Bithynia and wrote on remedies, and the poet, grammarian and physician

NICANDER of COLOPHON (B. C. 136) in LYDIA,

educated in Alexandria, whose poems "Theriaca" (On poisonous beasts) and "Alexipharmaca" (antidotes) are still extant. The first contains descriptions of the bites of serpents, especially of the viper, mentions leeches, cups and burning out the bitten part. The second poem teaches the removal of the poison in the first place by emetics, and its envelopment by drinks (milk, oil, wine etc.). It also describes in general the symptoms in cases of internal poisoning, especially by opium, colchicum, henbane, litharge, white lead etc.

In the last century before Christ lived

CRATEVAS (B. C. 70),

a famous rhizotomist, who dedicated to Mithridates a work on pharmacology with colored plates.

POSIDONIUS (B. C. 70)

too is reckoned among the Empirics, and indeed, even Cleopatra (B. C. 69-30), daughter of Ptolemy Auletes, the magnificent and captivating spouse of her brother Ptolemy XII., Dionysus, is mentioned in this connexion, in consequence of her literary labors on the subjects of cosmetics and diseases of women. Her course of life was undoubtedly adapted to give her abundant experience in these branches, and we need only admit that her amours with Cæsar,[1] Antony and others left her sufficient leisure to devote to their study.[2]

In this too she had as models her predecessors, the beautiful and starry-haired Berenice, the wife of Ptolemy Soter, and Arsinoë, the daughter of Berenice and wife of Ptolemy Philadelphus, both of whom had invented famous ointments and perfumeries. Indeed, according to the papyrus Ebers, articles of luxury and cosmetic appliances were in common use in Egypt at an extremely early period and were as popular there as under Louis XIV. and the regency, though their fragrance could not at either period remove the odor of the vices of society.

Cleopatra prescribes, e. g. for ulcers of the vulva: arsenic, burnt paper, elaterium, lathyris, sulphur aa. 6.6 grammes. Rub together and apply, or insert as a pessary, twice daily, night and morning, until the ulcer is healed. She is also acquainted with condylomata, rhagades and gonorrhoea, and discusses diseases of pregnant, parturient and lying-in women etc. Whether the queen was the real authoress of the work ascribed to her pen is doubtful.

The number of the later Empirics is great, but even their period is not always well established. We notice only

HERAS of CAPPADOCIA (B. C. 30),

who wrote a treatise on pharmacology (Narthex);

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[1] Even in this fallen age of the kingdom of the Ptolemies science in Alexandria stood so high that Cæsar, the ruler of the Romans (at that time at the summit of their power), authorized the Alexandrian Sosigenes to reform the calendar.

[2] With Cleopatra disappeared from the stage of history the Greek family of the Ptolemies, only to survive, however, (something like our Hohenstaufen family) in the immortal records of poetry and romance. Its Conradin, however, was named Cæsarion, and was put to death after the battle of Actium by the cowardly Octavianus.

Menodotus of **Nicomedia** (A. D. 100),
the inventor of the "Epilogism";

Zopyrus (about B. C. 80),
a cultivator of pharmacology:

Theudas of **Laodicea** (A. D. 117), a Jewish physician educated in Alexandria and famous as an anatomist, but opposed by **Galen**; **Quintus**, **Lycus**, **Satyrus**, **Æschrion** of Pergamus, **Pelops** of Smyrna, **Phecianus**, **Callicles** and **Numesianus**, who were all teachers of Galen.

Still later Empirics were **Agrippa** and **Sextus Empiricus** (A. D. 193), who exercised great influence even in modern times, as e. g. upon Pierre Bayle. Sextus thought the same thing might be defended or opposed on equivalent grounds, and was a pessimist also in regard to the object of existence. Both these latter physicians belonged to the philosophical sect of the Skeptics, the last offshoot of the Empiric school, which continued also to the very close of antiquity.

That the partisans of the two last mentioned "Schools" fell into all sorts of wrangles and quarrels, may be judged both from the known facts, and from the special dialectic training and ability of the later Greeks, increased, if not awakened, by their active and not always pure political and party life—yet the Empirics may remind us that diseases are cured by remedies, not by eloquence. Our own experience too of the course of affairs in later times may lead us to the same conclusion. Alexandrian science exercised a controlling influence upon all subsequent antiquity, and supplied even to mediæval medicine its educational material. Very much of what is ascribed to the later writers among the Ancients, and especially to Galen, really belongs to, and was taken from, the earlier Alexandrian physicians, whose works have mostly perished.

10. VETERINARY MEDICINE.

Some fragments of the veterinary work of Simon of Athens are still extant. Xenophon and Aristotle, too, touch upon veterinary subjects, and special works on this branch were written by the famous Diocles and Epicharmus of Cos (about B. C. 250), though no relics of them now remain.

We must here interrupt, however, for a short time, the further discussion of declining Grecian medicine, to examine the scanty traces of independent medicine among the Romans,—the next most highly civilized people of the old world.

11. THE MEDICINE OF THE ROMANS,

so far as we can speak of such an art, did not rise above the very first rudiments. In this department also the productive genius of the Greeks was lacking among the Romans, and here too the greatest and undeniably the most original people of antiquity in political science, borrowed from the Greeks intellectual grafts to improve their own dull (though vigorous) uninteresting and none too fruitful mental culture, — a culture which in fact lived, so to speak, upon the imported spices of Grecian spirit. And this Grecian spirit, so boundlessly rich, so attractive and yet so profound, could supply to this people, undoubtedly great in that element wherein lay its own weakness, and even in the ruin of its native land, an adequate and perfect pollen, which has for centuries, indeed, fructified our own civilization. There were then among the Romans a semi-original, mythological medicine, and traces of theurgic practices alone. All else belongs to the Greeks!

According to the well-known testimony of Pliny the Romans had originally no physicians, at least none whom we can consider educated in their art. "The Roman people for more than 600 years were not, indeed, without medical art, but they were without physicians." This art consisted merely in prayers, dietetic measures, prescriptions from the Sibylline books, charms etc. That the Romans cherished much grosser superstitions than the Greeks is well known. With rude simplicity they elevated into divinities those evils which especially harassed them, in order probably to rid themselves of them by such promotion, and then worshipped these deities with fervor. Thus fever and foul odors were worshipped as the goddesses Febris and Mephitis; in great weakness Fessonia was invoked; when the cloacæ exhaled foul odors, Cloacina! Even a goddess Scabies was not wanting, and a plague-god Angeronia; a goddess of menstruation and of the womb, Fluonia and Uterina; and Ossipaga, goddess of the navel and bones of children! Most numerous were the goddesses of midwifery, as Carna, who also guarded the powers of the stomach, Dea Natio, Deæ Carmentæ, Prosa and Postverta, who were invoked in false presentations. These goddesses designed for the female sex seem to have originated in the fancy of the midwives. The inventive genius of servants manifestly supplied the necessities of male superstition with the god Priapus, the visible representative of male generative activity, whose worship we have already noticed among the Phœnicians, and likwise existed among the Jews in their Lingamcultus. The presiding divinity in medicine, however, was Dea Salus, who watched over both public and private weal. Yet even of these gods and goddesses none seem original, but all to have been invented by Roman fancy at Grecian suggestion. The last mentioned goddess e. g. first received a temple at Rome, B. C. 450,[1] *after* Apollo Medicus, who enjoyed one as early as B. C. 467.[2] With this deity and their own divinities, who owed their very existence and names to an inapt and rude fancy, the Romans were not satisfied, but worshipped also Phrygian, Egyptian and Grecian medical gods, and built for them temples at Rome and in other places. In these temples the ministrations were offered in part by the original fellow-countrymen of the deities concerned, lest perchance they might be improp-

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1. A. U. C. 450 or B. C. 302. It was founded by the censor C. Junius Bubulcus B. C. 305 and dedicated B. C. 302. (H.)
2. This temple was vowed on the occasion of a severe epidemic at Rome, B. C. 430, and dedicated by C. Julius, consul, B. C. 428. (H.)

erly executed. Thus they sacrificed to Æsculapius (who was summoned from Epidaurus, B. C. 294, to be a Roman God), to Isis and Serapis, to Juno and Diana Lucina,[1] and they solemnized the mysteries of the Cabiri.

The theurgic practices to be followed in public calamity under the form of disease were fulfilled by the Haruspices and Augurs, who were of Etruscan origin, and rather ministers of state than of religion. Numa Pompilius (reigned B. C. 715–672), who promulgated the law relative to the excision of the child in case of the death of a pregnant woman, established also a College of Augurs, who, from the flight of birds and the entrails of animals, predicted health or the reverse, even as late as the time of Cicero, when they could scarcely look each other in the face without smiling. Distinguished men, nominated especially for this purpose, interrogated the Sibylline books, and in epidemics magic songs, learned from the Etruscans,[2] were universally sung. In order to propitiate the gods solemn processions were also instituted (as at a later period in papal Rome, which adopted much of its pageantry from the heathen), or a nail was driven into the right door-post of the temple of Jupiter Capitolinus. On the occasion of a dreadful plague in the year B. C. 400, the Romans solemnized the first lectisternium; that is, the images of the gods were placed upon couches, borne through the streets, and finally feasted with the best viands of the season.

Marcus Porcius Cato, the Censor (B. C. 234–149), opposed the gradual introduction of Grecian civilization, as he did everything not originally of Roman growth; for he was perfectly acquainted with that phenomenon which has recurred so often in history — the deterioration resulting from the contact of a more highly cultivated and correspondingly effeminate people with a nation of lower intellectual development, but physically more vigorous—and hence he desired to preserve Roman popular medicine to the exclusion of Grecian science. Accordingly he himself practised medicine after an old receipt-book, and recommended senseless magic songs (carmina), e. g. in dislocations, "Huat, hanat, ista, pista sista damniato damnaustra." Like the Pythagoreans he considered the cabbage — probably under the form of ambrosial sauerkraut — especially healthy, as was also wine.[3] He likewise understood surgical matters, and was a veterinarian to boot. Thus he had sick cows placed upon their hind-legs and drinks poured down them by men — but not for the world by women!

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[1] Compare Horace's

"Montium custos nemorumque, Virgo,
Quæ laborantes utero puellas
Ter vocata audis, adimisque leto,
Diva triformis."

[2] The Etruscans were an aboriginal Italian race, who possessed a very high civilization long before the Romans came into Italy. In ceramics, technics and architecture they occupied a high position, and carried on an extensive commerce with Egypt and the Orient in general, as well as with the north of Europe. Their written language, however, has never been deciphered.

[3] How coarse was the mode of life, even among the old Romans of rank, may be inferred from the kitchen receipts of Cato, in which flour-dumplings play the same rôle that they do among the Bavarians of the present day.

In this early period physicians formed a class despised by the better order of Romans, for medicine, down to the time of Cæsar and even later, was considered an occupation unworthy of one of the Quirites, in fact as "dishonorable." Old Roman physicians, therefore, (all the physicians seem to have been foreigners) are never mentioned by name, though we have accounts of greater or lesser epidemics, especially camp-epidemics.[1] By degrees, however, many Greek physicians of the lower order (equivalent to the so-called "itinerants" of the Middle Ages) wandered to Rome, in order to turn their knowledge into money in the wealthy metropolis of the world. In this respect we may draw a not uninteresting historical parallel between the mutual relations of Greece and Rome, and those of Europe and America at a later period. The older, civilized people fertilized the rising republic with their spiritual treasures and acquirements; the new state, in return, offered to the adherents of the old a better material existence here than at home. Another point of similarity may also be found in the fact that, in the beginning, chiefly the lower and impure elements of the Grecian medical profession travelled from Greece to the Roman capital, just as, after about 2000 years, the same thing occurred with respect to Europe and America.[2] The Greek aliptæ, bath-keepers and slaves, who claimed in Rome to be physicians and worked for pay, prepared for succeeding and competent physicians in Rome the same doubts and the same burden of scorn that their modern compeers occasioned for a long time among the more intelligent Americans. Greek physicians, therefore, were extremely disagreeable to the better Roman circles, and passed for charlatans and alchemists.[1] The first Greek surgeon who was attracted to Rome, or rather the first whose name has been preserved to us, was a certain Archagathus, from Peloponnesus, who B. C. 219 even received Roman citizenship. The story goes, however, that he was banished from the city as a "carnifex" ("butcher" is the vulgar expression to-day), because he used the knife and fire too freely.

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[1] Epidemics of a nosological character not definitely determined raged in the years B. C. 451, 436, 430, 412, 405, 395 (in the reports of this so-called "Pest of Diodorus" mention is made of "the physicians"), 383, 365, 331, 314 294, 276, 212 (before Syracuse), 205, 182 (in Rome), 163, 142 (in Rome), 55 etc. On these occasions aid was sought in lectisternia, auguries etc., and at one time, when men particularly succumbed beneath the plague, 370 old women—a class of whom many in the history of the world have fallen victims, even among the heathen, to mistaken belief and superstition,—were condemned to death. Thus the "Christians" do not stand alone with their belief in witches!

[2] The fanciful analogy here assumed is impaired by the consideration that while the Greek medicasters went to the metropolis of the world to make money and enjoy its pleasures, the pioneer physicians of America came to an untrodden wilderness, for the most part from very different motives. Nor do I know anything in the history of the American medical profession which warrants the implication of the text that its early representatives were inferior, mentally or morally, to the *average* of their European colleagues. Of course the most prosperous and able European practitioners felt no temptation to exchange the comforts and luxuries of civilization for the trials and dangers of colonial life in America. Of course quacks and other adventurers abounded, and it may even be (though I know nothing to establish the fact) that some of our pioneer physicians belonged to that class of whom the poet wrote:

> "True patriots all; for be it understood
> They left their country for their country's good."

But an age and hemisphere which produced a Fludd, a Greatrakes a Digby, a Butler, with other notorious charlatans, can scarcely rebuke the American colonies for harboring a few less famous, and, therefore, less dangerous, quacks. We shall see hereafter that the early physicians of the United States have left behind no reputation over which their successors need blush. (H.)

Not long after, however, the Greek physicians won an honorable position. Indeed the most distinguished Greek physicians of later times practised chiefly in Rome and the great provincial cities of the empire, to which rank even Athens had sunk. Here began a period in which a complete separation of Greek and Roman medicine is no longer possible, for both were continually jostling each other on one and the same field, the Roman Empire. Yet the leading views and the actual substance of the science were always borrowed from the Greeks, though Roman physicians, from this time forth, cultivated medicine in various ways. Still we may say, in general terms that there was no longer any original Roman medicine!

III. GREEK MEDICINE DOWN TO THE TIME OF THE ROMAN EMPIRE AND UNTIL THE PERIOD OF ITS OVERTHROW.

(GRÆCO-ROMAN MEDICINE.)

In spite of the subjection of the Greeks to the political power of the Romans, in spite of the loss of their political independence — a condition united among other people with their spiritual power, their inmost being and their capacity for action — still this unique Greek people preserved its old creative activity and power, ruled the Romans through these in the field of science, and thus vanquished their political conquerors in the sphere of intellect. Upon all people with whom the peculiar Greek spirit has ever come into contact, it has at least impressed its stamp. But it brought the Romans so completely under its power that they imitated its works, and, indeed, the rich and (what is ordinarily the same thing) the educated, especially after the age of Sylla (B. C. 138–78), chose the Greek as their colloquial tongue.

So much was this the case that not only were Greek schools sought after very much like our universities, but the Latin language itself assumed a Greek structure. Children were expected to learn to speak Greek, and for this purpose Greek nurses, teachers etc. were invited to Rome, and in the works of the most important Roman writers of the golden age of Latin literature we meet not infrequently scraps of Greek, upon which the authors pride themselves as openly as we did with French in the 18th century. This we observe even in Cicero!

Roman culture was so little independent that it can lay no claim to originality in anything save agriculture, jurisprudence[2] and architecture. For even the first Latin poets were Greeks (Livius Andronicus, Cnæus Nævius, Quintus Ennius, all in the 3d century B. C.), or wrote after Greek models, as Plautus (died B. C. 180),

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[1] Juvenal writes:

"Græculus esuriens in cœlum, jusseris, ibit."

[2] As the Greeks were the authors of public law, so the Romans created private law, both in contrast to the theocratic law of other ancient peoples.

Publius Terentius Afer (died B. C. 193), Pacuvius, Cæcilius Statius, Atticus, Horatius, Vergilius, Ovidius and Lucretius (died A. D. 55). In philosophy, oratory and historical writing too, the Romans followed the Greeks, as is manifest from Cicero, Livius (B. C. 58–17), Seneca and others. In like manner the most important statesmen, like Sylla, Cæsar, Lucullus, and Pompey, embraced the Grecian culture. The latter statesman also transplanted Greek medical literature to Rome, and is of special importance from the fact that he had his freedman Lenæus translate some of these writings into Latin.[1] Whatever great works in sculpture and painting the Romans possessed were also the creations of Greek artists. Even in the sciences of mathematics, mechanics, botany etc., the Greeks were likewise the teachers of the Romans. In these subjects the latter accomplished as little original work as they did in philosophy, which owes to them not one single original system. On the whole the Romans believed that the higher sciences were brought to perfection by the Greeks, a significant idea, which seems to have been transmitted to the Middle Ages.[2]

In accordance with this creative faculty of their spiritual being and their great power of intellectual amalgamation, the Greeks, even after the loss of their native nursery and home, planted among the foreign Romans a new doctrine, whose substance was largely furnished by the acquisitions of the Alexandrian school, and which completely supplanted, and checked the development of, the scanty germs of Roman medicine proper. They gave to ancient medicine a new theoretical foundation; in place of the humoral pathology which had prevailed since the days of Hippocrates, they called into existence its rival Solidism, destined henceforth to struggle with Humorism for the precedence, and thus they awakened between the two ideas a strife which after long centuries is not yet fought to a conclusion. A temporary exchange of the one for the other, as the weight of the spirit of the age has borne down the scale to either side, has been the only result.

The author of this new medical theory, which in the sequel became the occasion of a school long influential in medicine, and known by the name of

1. THE SCHOOL OF METHODISM,

was Asclepiades, of Prusa in Bithynia (B. C. 128–56).

He studied under Cleophantus at Alexandria, sojourned also at Athens, where he devoted himself to medicine and rhetoric, and practised then at Parion in the Propontis and on the Hellespont. After such extensive travels he came to Rome, where at first he taught rhetoric. Subsequently he practised medicine with such success—a result to which his philosophical education, as well as his adroit conduct and pompous behavior, greatly contributed — that the Romans considered him an angel sent from heaven. He was also on friendly terms with the most distinguished men, such as Cicero, Crassus the Orator, and others. Besides the advantages of such an acquaintance, he increased his fame in the eyes of the masses by the revival of a man apparently dead, as well as by his vehement repudiation of Hippocrates, whose teachings he named "a study of death". He censured the earlier physicians generally, and may be regarded, mutatis mutandis, as a kind of antique Paracelsus. His bold assertion that he who rightly understood medicine would never become sick may have impressed many persons, in accordance with Goethe's approved maxim: "Trust yourself and the people will trust you." This assertion was verified at least in his own person, since he did not die a natural death, but succumbed to the results of a fall, which he suffered in extreme old age.—Asclepiades wrote in the Greek language many works, of which fragments alone are preserved.

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[1] Many of the more important Latin authors belonged to the class of freedmen.

[2] Another weighty fact may be mentioned. The Romans liberated woman from the almost harem-like social position which she held among the Greeks, and thus prepared for her complete emancipation under Christianity and her equality in the family.

Judged by his teachings Asclepiades was a man of uncommon mental power and boldness; in his practice his methods were in part excellent. The reputation of great charlatanism — a little of it is found in all practice —which he enjoys in history is due to the hatred of the Romans (who felt their intellectual subjection to the Greeks), and to that of his ancient colleagues: for it is not conceivable that such important services would have been possible in association with gross charlatanism, nor is it to be assumed that an open, bare-faced quack could have enjoyed the steady friendship of the great men named above! He is not free, however, from a straining after originality, especially in his principles and methods of treatment, and in this he went so far as to turn upside down almost everything heretofore current. Hence he drew upon himself the hatred of those who clung to antiquity, and Pliny, openly and chauvinistically enough to render his motives perfectly clear, says:

> "This only can annoy us, that a man of this most fickle race, without any external aid, simply for the sake of his own profit, should have suddenly given the laws of health to the human race, though many persons have since abrogated them."

Be this as it may, Asclepiades was an intellectual pioneer and a man possessed of an extremely fine knowledge of human nature; one who merely used, perhaps a little too openly, that phrase, which in antiquity, and alas, to-day too, is often current or tolerated in practice.—"*Mundus vult decipi!*"— His fundamental ideas (and still more those of the Methodists, who claimed him as their founder), and particularly his therapeutics, which were modeled very little upon theory, have maintained themselves, though in a modified and somewhat masked form, even down to the present time.

His doctrines are founded theoretically upon the views of Heraclides of Pontus, and the philosophy of Leucippus and Democritus, completed by Epicurus. Practically, however, they are based on the teachings of the Stoa.—Heraclides of Pontus,[1] a pupil of Plato and Aristotle, assumed dissimilar, formless and changeable atoms as the basis of all things. Epicurus (B. C. 341–270), on the other hand, whose egotistic rule of life, to seek only after comfort and pleasure as the end of existence, has unjustly given him a bad name for all time, held the world to consist of innumerable most minute atoms, which, however, (and in this they are distinguished from the atoms of Democritus) meet not from necessity, but rather spontaneously. In this meeting self determination is also called into play.

The atoms are indivisible and cognizable by the spirit, but not by the senses.

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1. He taught the daily revolution of the earth from west to east, and the absence of motion in the fixed stars. He was the author of the so-called Egyptian (but actually Greek) system of motion of the heavenly bodies.

The latter faculties he held to be capable only of discerning the truth by means of experience. With how unprejudiced an eye he regarded experience may be inferred from the fact that he declared religion to be a product of fear. For this he was taxed with heresy—no harmless charge even among the heathen, who had their own inquisitors. The soul, as well as the body, he considered a substance compounded of atoms (but of the finest and roundest atoms only), and not a simple substance.—The Stoics, of whom Zeno (B. C. 340–260) was the first, laid stress upon a "natural" mode of life as the chief means of happiness.

In his philosophico-mechanical, general pathological and physiological views Asclepiades conceives matter to consist of extremely small, but still divisible and fragile, formless and mutable collections of atoms, the "Concretions" (συγκρίσεις), cognizable indeed by the understanding, but not by the senses. These originally moved about uncontrolled in the general vacuum of Democritus, and burst in pieces through accidental collisions. By union of the finest fragments thus engendered, the "Leptomeres", originate the visible bodies, whose differences of form and varying peculiarities have their foundation in the different association of the leptomeres into different bodies. The particles also leave between them little empty tubes, the poroi, in which move a multitude of the finest particles, which occasion sensation and correspond to the pneuma of others, here considered only atomically. If the motion of these particles is quiet and regular it is called health, but if it is irregular, feeble or boisterous, sickness arises. Sickness also originates in the air received in respiration and in the food, and enters our bodies in respiration and digestion, by both of which it passes through the poroi into the heart and the blood, and through this finally into the whole body which it nourishes. The pulse originates in an influx of the particles into the vessels; animal heat, sensation, secretion, in a similar way; hunger and thirst, however, originate in emptiness of the pores of the stomach, which, in accordance with our varying conditions, may be either empty, full, or contracted.

In surgery Asclepiades has won great reputation by his practice of tracheotomy in angina. He also recommended scarification of the ankles in dropsy, as well as paracentesis with the smallest possible wound. He observed too spontaneous luxation of the hip-joint.

According to him the proximate cause of disease is stagnation of the atoms; on the other hand he finds in the humors only a procatarctic cause.

In pathology he was the first to distinguish *definitely* acute and chronic diseases (for example dropsy). The special forms of disease are based upon the greater or less disproportion of the atoms to the poroi, and the grade of stagnation thus occasioned. Thus e. g. quotidian fever originates through the largest atoms, tertian through the medium-sized, quartan through the finest.

Upon the size of these atoms depends also the grade of the fever: larger atoms occasion severe, smaller, less dangerous fever. Fever heat originates in active movements of the atoms: the chilliness is due to their quiescence. Hæmorrhage is a result of putridity or of laceration, and does not depend upon synanastomoses.—Crises, in opposition to Hippocrates, Asclepiades totally denied, a denial which excited the special wrath of Galen. What is said in therapeutics of the activity of nature is, according to Asclepiades, pure sophistry! The physician alone cures, and nature simply supplies opportunities. In disease nature as often works injuriously as beneficially. The fundamental principle of his thereapeutics, as famous as it is impracticable, is expressed in the maxim: "The physician should cure tuto, celeriter ac jucunde."

In all this, and especially in his doctrine of indications, Asclepiades was the restorer of pathology and therapeutics.—Fever he regarded as a curative agency. In the beginning he denied both food and drink, "so that he did not allow the mouth to be rinsed even once"—a fatal principle, which maintained currency until the time of Van Helmont, and even until late in the present century. In this stage he recommended clear light. At a later period, however, he allowed good food. Certain methods of treatment were followed at certain definite periods, and thus arose the doctrine of cyclical cures. Thus on the third day of fever he would give an enema; on the fifth, an emetic; on the sixth, rest in bed. He discarded, however, the use of medicines, and especially of strong, debilitating remedies, and rejected violent purgatives and emetics, counselling, on the contrary, dietetic and hygienic treatment, enemata, cold baths, drinking cold water, and especially the use of wine in convalescence. The shower-bath, exercise, riding, even music, singing and declamation were also employed therapeutically by Asclepiades. He often practised bleeding, but cautioned against the use of cups, while strongly favoring frictions (massage). The latter were frequently employed in the gymnasia of the ancients (even to excite sexual desire), and especially in the Oriental gymnasia, whence Asclepiades, as a native of Asia Minor, may have taken them. They became very popular at that period (like massage in the present day), and were submitted to by even queens and empresses. They were to be continued until sleep supervened, which latter Asclepiades considered wholesome. In "Phrenitis" (a term which he is the first to use in the sense of mental disturbance) he utterly discarded the use of the dark chamber and bleeding, but recommended decoctions of poppy and henbane, wine and sea-water. In tetanus he administered warm baths[1] and inunctions of oil, while in epilepsy he advised sexual intercourse. In regard to cold baths, Asclepiades exercised upon his own time an influence similar to that of the Silesian peasant Vincenz von Priessnitz (1799–1851) upon ours. Asclepiades, however, differed from Priessnitz, as his friends Cicero and others differed from the artless nobles who suffered themselves to be macerated by Priessnitz.—At that time the cold-water and hardening mania was so strong among the blasé aristocracy of Rome, that even a Seneca on the first day of January bathed in clear running water: "I, as a pronounced cold-bather, on the first of January sought the canal, and began each new year by jumping into the aqueduct, instead of reading, writing or rehearsing something." (See Marx.) Therapeutics corresponds at all times to the physical and intellectual condition of a people: from this the science originates, and to this it accommodates itself. The science of therapeutics too is not born in the heads of physicians alone, but is the offspring of all the circumstances of a period!

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[1] The Roman baths were arranged as follows: 1. The hypocaustum or hot-air chamber in the basement: 2. The vasarium, an apartment with three basins placed one above the other, which supplied by means of pipes, hot, tepid or cold water, according to their distance from the first, or hot-air chamber: 3. The balneum, with a basin (alveus), upon whose border (labrum) or upon special benches (solia) the bathers seated themselves: 4. The laconicum with a steam boiler, which could be opened by a valve to let the steam out, and perforated stools or benches: 5. The tepidarium for warm-air baths: 6. The frigidarium for cooling off by sprinkling from a tub (baptisterium) and in a cold bath: 7. The elæotherium, a room for keeping the vessels of oil and ointment, and for inunction:—The balnea pensilia (invented, according to Pliny, by Sergius Orata, but ordinarily ascribed to Asclepiades) were similar to our shower-baths of the present day, though probably produced by condensation of the steam upon the ceiling of the bathroom, and its subsequent precipitation.

We may also remark here that not only artificial baths, but natural baths likewise (sea-bathing at Baiae etc.), were commonly used among the Romans, especially the indifferent warm-baths e. g. Baden-Baden, Wiesbaden, Badenweiler, Baden im Aargau, Aachen etc. in Germany. They also had their seasons for bathing, and traveled to the baths *comme chez nous*. The fact that the Ancients had no body-linen, and wore only woolen outer clothing, rendered necessary the use of daily baths. The same thing is true of the whole Middle Ages, and this circumstance explains the existence and general diffusion of bathing-houses even in small places and in the camps.

If in the therapeutics of Asclepiades we separate the chaff (of which there is quite enough in all systems) from the wheat, we must admit that in this branch of medicine too he was the pioneer of eminent improvements.

His scorn for anatomy and physiology deserves all reprobation. Yet he experimented in the latter branch, as we learn from Tertullian:

"Asclepiades may investigate goats, which bleat without a heart, and drive away flies, which fly without a head."

This scorn for anatomy he shared too with famous practitioners of a later age!

Followers and pupils of Asclepiades (Asclepiadists) were: PHILONIDES of DYRRHACHIUM (about B. C. 42), NICON of AGRIGENTUM (about B. C. 49), TITUS AUFIDIUS of Sicily, (about B. C. 44), who wrote on chronic diseases and recommended in the treatment of melancholia whipping, hunger, thirst and occasional coitus, which latter, according to Hensler, was at that time, curiously enough, counted among the bodily or gymnastic exercises. MARCUS ARTORIUS (about B. C. 31), who saved the life of Augustus at the battle of Philippi; CLODIUS and NICERATUS, who wrote on catalepsy, and left us some recipes (about B. C. 42); CHRYSIPPUS, who wrote on intestinal worms; MILTIADES ELAIUSIUS, who wrote on chronic diseases; SEXTIUS NIGER, a friend of the physician next mentioned and a laborer on the subject of simple medicines (about A. D. 50); JULIUS BASSUS, a Roman, who wrote in the Greek language a work on drugs (about A. D. 44); PETRONIUS MUSA and PETRONIUS DIODOTUS, writers on medicines, and ALEXANDER of LAODICEA. ANTONIUS MUSA[1] (A. D. 10) cured Augustus (B. C. 63–14 A. D.), whose slave he had been, of a disorder of the liver by means of cold poultices and baths. He was also the physician of Horace. EUPHORBUS, a brother of Musa, was physician to JUBA of NUMIDIA (died B. C. 46), and is said to have been the god-father of the Euphorbiaceae.

The most important pupil of Asclepiades, and one who in his old age changed and corrupted his master's doctrines, as a basis for the system of "Methodism" was

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[1] An "Instructio de bona valetudine conservanda", assigned to the pen of Musa, is still extant.

THEMISON of LAODICEA, (B. C. 50).

He was the author of a work on chronic diseases; wrote on the plantain, elephantiasis (on which he was the first writer), and some medical letters, and would have written also on rabies canina, but gave it up, because in his earlier life the sight of a case had sufficed to sicken him with the same disease, and he feared a relapse should he undertake to write about it. From quite comprehensible causes he was a poor practitioner, in spite of his invention of famous remedies, like the diacodium, the diagrydium etc.

He left the atoms of Asclepiades entirely out of consideration, but classified diseases all the more strictly in accordance with the condition of the poroi. Accordingly "disease" consists in either a contraction or relaxation (status strictus or laxus) of the latter, to which Mnaseas subsequently added, as a third characteristic, a mixed condition (status mixtus). Subsequently another "community" (as these general characteristics were called) was added, the "community of time or course" in acute diseases, according as these were in the stadium of increase, of maximum, or of decrease of the symptoms; hence proceeded the invention by the Methodists of the "three day periods" (*diatritus*), of which the first seven days contained three.

The system thus formed passed as "a method" intermediate between the strong Dogmatism and the Empiricism of the foregoing physicians, and was opposed to both. At a later period the subject received a scientific dress and was spoken of as a "method of science" which sought "the communities", in order to base upon them the cure of diseases. Everything except the supposed general condition of the body in question lost its importance. Such was the fate of diagnosis, the anatomical seat of disease (the better Methodists were not ignorant of anatomy), symptomatology, ætiology, constitution etc. Upon the recognized community the physician built up his "indications" for the treatment, whether to relax or astringe or — in mixed conditions — to remove the most prominent community. As, however, these three indications did not suffice for all cases, in course of time the "surgical indications" and the "prophylactic indications" were added. The former were directed, 1. to the removal of all foreign matter which had obtained entrance into the body e. g. foreign bodies; or 2. the removal of such foreign structures as had originated in the body without external agency, e. g. tumors; or 3. the correction of changes of position, as in fractures of bones; or 4. the repair of defiencies of substance, e. g. in ulcers, arrest of development, like hare-lip etc. The "prophylactic indications" related to conditions which would not fit any of the old "communities", e. g. poisoning, the bites of poisonous beasts, in which the poison must first be removed.

Thessalus made a further addition to this theoretically imperfect structure in the "metasyncrisis" (recorporation), which was to be directed especially against chronic constitutional diseases, where the other methods of treatment were of no benefit. This name can be found even as early as Hippocrates. The object of the metasyncrisis was to bring the atoms into different position—here too the "cyclical cures" were of service — and it consisted of the "recorporative" part, through which, notwithstanding it contained a depletive treatment, the forces might be restored, and the "regenerative" part, which was designed to change the whole bodily condition.

The "community" was diagnosticated especially from the condition of the evacuations and secretions, from the circumstance whether they were restrained or profuse etc.

For example: the status strictus prevails in putrid fever, in which the heat is restrained by "soot" (fuligo): the status laxus exists in swooning from loss of blood, in too frequent alvine evacuation, in sudden joy: the status mixtus, in epilepsy, paralysis, lethargy, catarrh etc.

The crises and critical days were discarded. Since the physician, not nature, cured disease, the maxim of Hippocrates "Life is short, art is long" might have been exactly reversed.

Remedies for certain "communities" were, e. g. in the status strictus, warm baths, warm lotions, warm, moist air,[1] warm poultices, diaphoretics, diuretics, cathartics, expectorants, emetics, bleeding (which the Methodists practised upon the side opposite to that affected), cupping, scarification, leeches (which Themison was the first to introduce into practice!)—measures employed as well in stricture in general as in that of any special organ, since in the latter case too we can only act upon the whole body. Dietetic measures are withdrawal of nourishment, pure, warm and clear air, sleep, since it not infrequently occasions perspiration, moderate joy, bodily exercises in affections of the head, asthma, running in corpulency, hunting on foot and on horseback, moderate coitus, since it warms and evacuates the semen (retaining it occasions headache, melancholy) etc.

Against relaxation: pomegranate, sanguis draconis, absinthium, myrrh, verbascum, chalybeate and alum-water, cold baths etc. Dietetically: cold air, abundant food, red-wine, rest, fright etc.

In mixed conditions the suitable remedy was selected in accordance with the most striking community.

As regards the three day periods: in pneumonia, during the first three days no food and no drink were given, and living in tolerably warm air with the horizontal position were recommended. At the height of the disease the chest was rubbed and enveloped in cloths dipped in oil, and sleep was forbidden. After the crisis of the disease sleep was again permitted, and a venesection was instituted! Barley-water, fresh eggs, or a drink of anise, honey and oil were given for nourishment,[2] and cups and steam baths were employed externally, a mixture of honey and the yolk of eggs etc. was used as an expectorant—and finally a blistering plaster was applied to the chest!

Example of a "cyclic cure": preparation: first day—little food and water, or, with the robust, total withdrawal of both: on the second day—little exercise, rubbing with oil, the third part of some specially prescribed nourishment, or of the ordinary food, and so on for two or three days: then in addition a second third of this food,

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1. They taught that more attention should be directed to the air, which we are forced to inspire constantly, than to our meat, which we indulge in much more sparingly.
2. It may be remarked here that Greeks and Romans down to the time of the Empire knew nothing of bolted flour, and used universally rye-flour (Liebig). Accordingly the sole bread of classical antiquity was pumpernickel!

and after 3 or 4 days for the first time a full portion. In a similar way they gradually increased the exercises and the wine! Metasyncrisis: first day—fast; second day—exercises, inunction or bathing, moderate use of wine, one-third of a portion of roast meat, salt meat with capers or mustard, or preserved unripe olives; after 2 or 3 days two-thirds of a portion of food: after the same number of days a full portion. The diet was changed, and this process repeated, until at last a new cycle was introduced with emetics of radish etc. The injurious effects of the emetic were prevented by sleep—on the whole a thoroughly "methodistic" treatment!

It is manifest from the preceding account that the fertile ideas of Asclepiades were merely reduced to the dead level of a system by "Methodism", and that even his therapeutic methods gained nothing in the hands of the Methodists, although their therapeutics (a science in which they even formulated certain enduring rules) was certainly their best contribution to medicine. That, however, distinguished physicians of that and a later period — for we can feel no surprise at the characterless Roman people of later times, who judged everything by superficial appearances — adhered to this "most practical" of all systems, is only to be explained by the strong ebb which had begun to manifest itself in the higher intellectual departments, and which the rapidly sinking wave of ancient culture introduced and brought with itself. Fortunately, however, some few good spirits shunned, or at least endeavored to shun, the headlong current!

Among the other Methodists, Thessalus of Tralles (A. D. 60), the son of a weaver, was at all events one of the most talented.

He was a sort of antique "natural" doctor, for Methodism recalls in many ways the so-called "natural medicine" of modern times. Thessalus was entirely without any school education, and was compelled to rely solely upon his untutored and natural genius. He scorned all science and the educated physicians of antiquity, and boldly trod the road of charlatanry and rodomontade. He fawned upon the rich, and became the leader of a medical mob which followed him on account of his birth and bringing up, and he has thus become for posterity the model of a medical charlatan. He called all the physicians of earlier times bunglers (a thing which has been done too by otherwise reputable physicians of modern times), protested that he could teach the whole of medicine in half a year, and called himself the "Conqueror of physicians"! He was always surrounded by pupils of a station similar to his own, and with them he used to visit his patients, a custom which, as we know, found official acceptance in the 17th century. Thessalus was, so to say, the original founder of the "Poliklinik". He enriched Methodism with the "metasyncritic treatment", which he employed in ulcers.

Among the followers of Thessalus were: Menemachus of Aphrodisia, Olympicus of Miletus (A. D. 70), Mnaseas (A. D. 80), Apollonides of Cyprus (A. D. 100), Julian the elder (A. D. 140), who opposed Hippocrates and wrote an introduction to medicine. He had studied with Galen in Alexandria, but subsequently became his enemy.

Other Methodists were: Eudemus (B. C. 15), who wrote on hydrophobia, and Vectius Valens (about A. D. 23),

both infamous for their scandalous relations, the former with Livilla, the daughter-in-law of Tiberius (B. C. 42–A. D. 37), whose husband, Drusus, he poisoned; the second with Messalina (murdered A. D. 48), who had Livilla executed. Livilla herself was a daughter of the no less infamous Agrippina, who, with the aid of the physician Xenophon of Cos made away with her husband, the emperor Claudius, by means of a dish of poisonous mushrooms—a nice party of ladies and physicians!

Scribonius Largus (A. D. 45),
a compiler of medicines, especially those of a popular character, who was also the first to recommend the electricity of the electric ray in cases of headache:

Meges (B. C. 20),
a surgeon who observed tumors of the breast and forward dislocation of the knee joint, and invented instruments for lithotomy:

Philumenus (about A. D. 80),
a very famous physician, who mentions podalic version, contracted and oblique pelves, uterine polypi, points out too great youth and too advanced age as causes of difficult labor, teaches the treatment of disturbances of health during pregnancy, determined the treatment of the different forms of diarrhœa, composed the remedy "Anthora" used for ulcers of the mouth etc.:

Andromachus, The Elder (A. D. 60),
inventor of the "Theriaca", a universal remedy composed of more than 60 drugs and said to be efficacious even against wounds. He was also the first "Archiater" (though, according to Brian, the notorious Xenophon, who poisoned Claudius, and, according to others, a certain Eutychus, bore the title before him), and the physician-in-ordinary of Nero.

Soranus of Ephesus,
was an unprejudiced and sharp-sighted observer and diagnostician, whose ability, erudition and experience as a practitioner were not fully recognized from his own writings until the present century. He was the son of Menander and Phœbe, and lived in Rome in the time of Trajan (A. D. 98–117) and Hadrian (A. D. 117–138). He enjoyed great reputation as a physician and obstetrician, wrote on many subjects of medicine, surgery and midwifery, and passed among the ancients as the best and most learned of the "Methodists". Fourteen of his writings have been enumerated, of which his famous work "On Diseases of Women" (in the original Greek), a work on "Chronic Diseases" (translated into Latin by Cælius Aurelianus), a treatise on medicines (translated into Latin), and one on the etymology of the names of the parts of the human body, are still extant. The first is the only gynæcological work preserved from antiquity written for the use of midwives. Its contents furnish evidence that gynæcology and obstetrics, both ordinary and operative, as well as the management of the child, belonged among the most perfect branches of ancient medicine. The work is quite full of surprising and acute remarks, which prove that it is only in our late day that the perfection of the ancient Soranus has been in many respects regained! For example, in coitus and menstruation the os uteri opens—a statement recently confirmed, as regards coitus, by the observation of an American physician. He distinguishes the vagina from the uterus, and compares the latter in form to a cupping-glass.—Extirpation of the uterus (which was performed also in antiquity) is not necessarily fatal.—Virginity prolongs life.—Coitus at the close of menstruation is most readily fruitful.—Artificial abortion in the third month is least dangerous; yet it may be dangerous from the production of tetanus etc.—Careless manual removal of the adherent placenta may produce inversion of the uterus.—If the placenta is not separated, both ends of the cord (cut with a sharp instrument) must be tied.—The parturient woman sits upon the lap of another woman, or better upon the labor-stool recommended and carefully described by him.—He gives an

extremely careful description of the requisites for a good wet-nurse, and of the bathing, and general bringing-up of children. They should never be weaned before the sixth month, and then their food should be thin pap and soft eggs. Remarks on the artificial feeding of children (without a nurse) are entirely wanting, as is the case with all other ancient physicians. (Biedert.) This fact may be explained by the supposition that the Ancients may have had sufficient nurses in their female slaves. Incision of the gums in difficult teething Soranus mentions, but rejects. In ophthalmia neonatorum he recommends instillation of oil.—Amulets and the like are permitted in metrorrhagia, since they maintain hopefulness (!).—Percussion and succussion serve to distinguish between moles and tympanites. An account of a vaginal speculum is given, and directions for reducing the vagina to virginal size by the introduction of tampons saturated with a decoction of galls—a cosmetic practice very common among Roman ladies![1]—He displays a knowledge of internal investigation with the oiled finger, of the knee-elbow position, evacuation of the bladder by the catheter, and rupture of the membranes to aid in difficult labor.—Version may be performed by either the head or feet (and indeed in living children).—The hand should be introduced into the uterus with the fingers formed into a cone.—Mention is made of dismembering of the child, craniotomy etc.

ATTALUS

was a pupil of Soranus, and a practising physician about the end of the second century.

MOSCHION DIORTHOTES

(Muscio, probably in the 6th century according to Val. Rose) also wrote on diseases of women. His manual for midwives was first translated into Latin, and then from this back again into the Greek, and is taken from the work of Soranus; at least it varies very little from the latter treatise. He opposes the theory of the origin of the male embryo in the right, and of the female in the left side, gives correctly the symptoms of incipient abortion, and is acquainted with face presentations. He gives as the cause of fluor albus too violent sexual desire, and teaches that the umbilical cord should be cut with a knife or scissors, instead of separating it (as had been done from antiquity down) with a piece of wood or a hard crust of bread. The menstrual blood serves during pregnancy as nourishment for the child; hence it ceases to flow during this period, and is secreted during the intervals of pregnancy. After severe diseases it also ceases to flow, and is devoted to strengthening the patient.

The following passage displays close observation: "Sterility is a disease common to both women and men" (in the latter it has not been thoroughly studied until recently). "In men it is occasioned by prolonged bodily weakness etc.; in women, when they are too lean or too fat, when the mouth of the womb is closed or too narrow" (this has no reference to Sims' uterine surgery, for by the mouth of the womb the Ancients understood the introitus vaginæ) "or beset with callosities, indurations or ulcers."

CÆLIUS AURELIANUS,

who lived, practised and taught at Rome at the close of the 4th or the beginning of the 5th century A. D. (though Rohlfs places him about the time of Galen), was a native of Sicca in Numidia. His writings "On chronic diseases", Questions and answers on materia medica, and "On diseases of women", which are in part (especially the latter) translations of the works of Soranus, are still extant. Gout is particularly well analysed and described, and the same may be said of hydrophobia. He also describes a kind of condensed milk, and knows of additions to prevent its becoming sour (limestone). He is the first who distinguishes priapism, satyriasis and phthiriasis as special diseases. (Rohlfs.) He especially advanced differential diagnosis. Even auscultation is hinted at in his works. He also is the representative of excellent therapeutic principles: e. g. he does not wish to cure the fit of gout, but to guard against its return; he mentions the benefit of nutritive enemata, and of the exhalations of forests in diseases of the chest (recognized also by Galen). His ideas on diseases of the nerves and mind are especially important. He discarded restraint, and desired isolation of the patients. We are chiefly indebted to him for our knowledge of the views and principles of the Methodists, and during the Middle Ages his books served as the guide of the medical study and practice of the monks. BELLICUS and LUCRETIUS were his pupils.

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[1] It may be remarked here that an historical study of the sexual relations and customs of different people and ages is yet to be written; and, disgusting as the subject and the results of the investigation would often prove, it would still form an important chapter of the history of humanity. Dufour's "Histoire de la Prostitution" and other works furnish materials.

The following physicians, like the last two, are known by name only as "Methodists": XENOPHON (he named the different parts of the body), ÆLIUS PROMOTUS, DIONYSIUS, PROCULUS, ANTIPATER, APOLLONIUS OF CYPRUS, RHEGINUS etc.

The Methodists were finally merged into the following schools, but their views and writings continued popular until far into the Middle Ages, and have appeared with some changes even in modern times. Inasmuch as important changes in the social position of physicians in the Roman empire were connected with some of the Methodists, it seems most appropriate to unite with what precedes the consideration of

2. THE MEDICAL PROFESSION AND MEDICAL REGULATIONS UNDER THE ROMAN EMPIRE.

The Romans no more bred a medical profession than they created a medical science of their own, unless we include under this head the Augurs, Haruspices and similar ministers of superstition. The latter, however, did not (as among other people) transform themselves in course of time into active physicians. In the medico-social department likewise the Romans remained under the guidance of the Greeks. The earliest (and most of the later) regular physicians in the Roman state belonged to the latter people. They were accommodated with so-called "medicinæ", public shops, in which they both prescribed and prepared and sold medicines. These shops corresponded to the Greek Iatreia, and in some respects to the "offices" of American physicians. Unfortunately, however, in the beginning the best representatives of medical science did not come to Rome, and the innate contempt of the Romans for professional medicine,[1] together with their strong national hatred for the Greeks, was only promoted by the despicableness of the first so-called Greek physicians (bathers, barbers, and the like), who immigrated into their state. For both these reasons, therefore, the free Roman found little reason to choose the medical profession, which was among the Romans always a completely free occupation. This is manifest from the following declaration of the learned, but intensely Roman, Pliny:

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[1] Among the Romans as well as the Greeks (and later slave-holding people in general) all earning of money by either bodily or mental labor was regarded as plebeian, or suited only for slaves.

> "The dignity (!) of the Roman does not permit him to make a profession of medicine, and the few Romans who begin to study it are venal renegades to the Greeks."

As, however, the practical, sober-thinking Roman learned to see the advantage of physicians for the maintenance and increase of his possessions, and especially of his slaves, he bought in foreign lands slaves who had been already educated as physicians, or he allowed his own slaves to be brought up as physicians at home (medici servi), and these slaves, in consequence of the expense bestowed upon them and the profit to be obtained from them, were valued above all other living possessions.

> "Since we estimate a notary as worth 50 solidi ($260), we will assume physicians and midwives to be worth 60 solidi ($315).[1]

As, however, such slaves might die natural deaths, or might be manumitted, the close-fisted old Roman, like the parsimonious Italian of the present day, gladly made use of hired slaves of this kind, among whom there must have certainly been some magnificent specimens! One of these e. g. served his master first as compounder of poisons; then he became a thief and a murderer, so that his tongue was finally cut out and he was crucified! How highly (taken as human beings) such servile physicians were valued, and how far they were considered pure wares and pieces of movable property, is proven by the classico-economical advice of the slave-breeding Cato:

> "Sell the old cattle, infirm oxen, worthless sheep, wool, hides, wagons, old furniture—old slaves, sick slaves—and suchlike things!"

Freedmen physicians (medici liberti) were employed in the public service (servi vel liberti publici), and these were held in greater esteem than the private medical slaves. These freedmen were frequently manumitted by their masters under the conditions that they must treat their friends gratuitously, and in case of necessity support the masters themselves by their practice.

The physicians of the lower class were also frequently employed as assistants by the very busy higher practitioners.

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[1] This valuation is from the period of the later emperors. Servile physicians were placed under the control of an overseer (superpositus medicorum). The position and treatment of these slaves, however, among the Ancients was entirely different from that of the negro slaves of modern times, and in the later times of the empire they became so numerous as to far exceed in number the free citizens.
(Baas.)

The same law estimated the value of an ordinary slave, possessed of no trade, at 20 solidi; if possessed of a trade (notaries and physicians excepted), at 30 solidi. But an ordinary eunuch was valued at 50 solidi, and if possessed of a trade his value rose at once to 70 solidi. (H.)

A few only of the Quirites occupied themselves professionally with medicine. Most of the physicians, even under the Empire, were Greeks (slaves) and Egyptians. The contempt of the Romans for medical men was not lost even when better physicians came from Greece and received citizenship. These too were driven away! This feeling changed somewhat at a later period, when citizenship was granted by Cæsar. (B. C. 100–44. Antistius was the name of the physician who examined his death-wounds.) to all physicians. Asclepiades and Musa especially exercised the most permanent influence in increasing the public estimation of physicians.[1] From this period forward under the Empire physicians (in glaring contrast to the contempt under which they at an early period labored) were favored almost beyond bounds. For the physically depraved Romans comprehended their advantage and necessity for their own sickly bodies. Hadrian in the year 133 even granted them immunity from taxes, military service etc., and they were also free the duty of supplying post-horses in the travels of the higher officials. (See Ritter von Rittershain).

The emperors created court-physicians and physicians-in-ordinary (archiatri palatini),[2] as well as city and district physicians (archiatri populares). Municipal physicians with a salary already existed in imitation of Greek institutions. They were called archiatri municipales.

The court-physicians belonged to the court officials of the second rank, and were addressed as "præsul spectabilis". The honorary titles of vir perfectissimus, vicarius, comes, and even of dux (a ducal or princely title) were assigned to them, proof enough that the Romans since the days of the Republic had lost an immense share of their earlier rustic simplicity and vigor! A few of these court and ordinary physicians received an annual salary of many thousands, exclusive of other emoluments. Others were the ordinary physicians, and frequently the favored lovers of the empresses. When they withdrew from service they became "ex-archiatri". Often, however, they took the position of archiatri populares (or voluntarily permitted themselves to be transferred thither), since this office seems to have been more lucrative.—The archiatri populares were neither purecommunal physicians, nor Physikatsärzte,[3] nor yet professors in our modern sense, but in one and the same person represented all these three offices alternately. They were chosen, not by the government, but by the citizens and the municipality. Antoninus Pius decreed that 10 should be chosen for large cities, 7 for medium-sized cities and 5 for small cities.

The COLLEGIUM ARCHIATRORUM, which was composed of all the archiatri of a city, received the candidate into the ordo (guild) archiatrorum, if an absolute majority of voices (in Rome 7 out of 12) in the college voted for his worthiness, and then assigned to him the position of junior fellow of the college.

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1. Musa by his successful treatment of Augustus earned his freedom, Roman citizenship, much money, and the knight's ring, the latter the prototype of the ring subsequently placed upon the finger of the graduating doctor.

2. Nero employed them to treat the bruises contracted during his nightly revels incognito in the streets.

3. District health officers with extensive powers and duties. (H.)

The choice and reception were to be made solely on the ground of capacity, and not through the recommendation and favor of the influential. In a similar manner the vacancies resulting from misfortune or death were filled anew. If all these formalities had been fulfilled, the imperial confirmation was required for the archiatri palatini only.

The archiatri populares, whose number was first fixed by law under Antoninus Pius, in return for a fixed position and salary (payable semi-annually), were required to treat the poor gratis. They had the right, and it was their duty, to teach medicine, and they instructed poor students without pay. They received from the municipalities an extra allowance in the shape of the products of nature, and both portions of their pay were to be delivered without deduction so long as they held the office. In their private practice, however, they could also accept fees and donations.

"They shall have an annual salary, in order that they may honorably serve the poor, rather than basely grovel before the rich. We also decree that they may accept something for their services from those who have recovered and offer it to them, but not from those who are yet in danger from disease." (A. D. 370).

The archiatri populares (who were similar in functions to our Physikatsärzte, except that they were not legal physicians to furnish judicial opinions) might also be removed on obtaining the opinion of reputable colleges. Any insult offered them exposed the offender to a fine not to exceed $5000.

The colleges of the archiatri had the oversight of the ordinary practising physicians (artifices), among whom there were Jews, even in Rome as early as the first century. The income of these practising physicians depended upon their fees alone. These, provided the physician belonged to the freeborn, could also be sued for at law. From this rule was excepted, however, whatever fees a sick person, in danger of dying, had promised to pay, or had left to the physician in his will. The number of these physicians must have been large. At first they enjoyed almost equal privileges with the archiatri At a later period, however, their rights were more circumscribed, yet there was always guaranteed to them an honorable position, particularly to those who settled in their native city.

"We ordain that physicians, and above all archiatri and ex-archiatri, together with their wives and children, as well as their property, shall be free from every payment of taxes, and from all offices both public and civil; and that they shall not be compelled to entertain public guests in the provinces, nor in any way to administer a public office; nor shall they be summoned to defend themselves in court, nor cited before the Imperial court outside of their province; nor shall they be insulted in any way, but whosoever insults them shall be punished according to the special judgment of the magistrate alone. We command that a stipend and salary be given to them, in order that many of them may the more readily devote themselves to the liberal studies and the beforementioned arts."

Hence the rush for the lucrative medical profession was immense, particularly as from the outset it fell under the laws of free-trade, and thus the door was widely opened to the ignorant and impure elements of society. The latter availed themselves too so freely of their opportunities, that in Galen's day many so-called physicians could not even read perfectly.

That the number of physicians in ancient times was generally very large is rendered certain from the following considerations. If the conclusion, that in times when there are many physicians, much will also be written on medical subjects, is as just (and it is verified by our experience to-day) as that other conclusion, also depending upon direct daily observation, that when there are many physicians there will be also much "doctoring" and medication, then it follows from the number of medical authors known by name from the period of the School of Alexandria down to the time of Galen, that there must have been at that period a very considerable number of physicians—a number quite as considerable in proportion to the population of the period as it is to-day.

According to Strabo (B. C. 66–A. D. 23), there were district physicians, even in the country, in Gaul about the time of Christ (Hæser), and consultations (always a sign of too much of a good thing) became at an early period so great a nuisance that Hadrian conceived the idea that the number of physicians called in as counsel in his illness contributed to his ruin!

Accordingly there appeared a phenomenon which always manifests itself when the profession is overstocked. Among these physicians were many specialists, numerous oculists, aurists, surgeons, dentists, uroscopists, specialists in bleeding, catheterization and clysterization, herb-doctors, milk-doctors, gynæcologists (paints, toothpowder etc., of which the ladies made great use,[1] belonged in their department), movement-curers, specialists in private diseases, in the treatment of fistulæ, in the cosmetic art, hair-doctors, wine-doctors (in the style of the cider and perry-doctors appearing in the German capital), hernia-doctors etc., etc.

Among the oculists we may mention the famous Charmis (about A. D. 33), who was paid for the cure of a single patient about $10000: P. Decimius a clinical physician and oculist, who left a fortune, although he had been a slave: Gaius and Euelpides (about A. D. 54): Zoilus (about A. D. 69). Their ointment-pots and business-stamps have been found almost everywhere where Roman legions were stationed.[2]

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[1] Martial says:

"When thou at home and absent, borrowed hayre
And tyres for thee the shops doe still prepare;
When teeth as cloaths, at sleeping times layd by,
Thy face at night doth never with thee lye;
Locked up in hundred boxes; whence i' the morne,
That looke they bring thee out is next day worne."
(Old translation.) (H.)

[2] If from remedies one may infer the diseases for which they were employed, trachoma must have been very frequent among the Roman soldiers; for sulphate of copper is one of the remedies most frequently found. That the stamps of so many oculists have been preserved depends upon the fact that all ophthalmic troubles (myopia, presbyopia etc.) in antiquity were treated solely by medication, for glasses were unknown. From the expression "Ad claritatem" sc. visus, it may be inferred that remedies supplied with this label—chiefly balsamic preparations, which are employed even to-day to "strengthen" the eyes, when glasses are really required—were used for defects of vision. The "oculists" whose

False teeth, and sets of teeth constructed of ivory fastened with gold wire, existed as early as the Laws of the Twelve Tables.

"In Rome this evil"—and the decay of science and practice which accompanies it and is always one of the symptoms of the decline of the moral power of all national spirit,—"reached its acme, and a condition was developed, which, in all its repulsiveness, stands at the present day daily and hourly before our eyes." (Hæser.) The hereditary vices of the medical profession, vices depending upon the uncertainty of therapeutic skill and the associated precariousness and uncertainty of external existence, upon which the laity at that time poured out their contempt, and concerning which physicians raised loud lamentations—colleagueship, even then, as to-day, often a synonym for professional jealousy, reciprocal open and secret disparagement, envy, want of *esprit du corps*, flattery of, and fawning upon patients and their friends, open and secret dishonesty, greed and covetousness, abandonment of scientific effort, forgetfulness of the humane side of the profession etc., etc. —arose to frightful proportions; so that Galen, who had a just and noble conception of his calling (doubtless influenced by a feeling of sickness springing from his love for his profession), complains: "There is no distinction between robbers and physicians, except that the former commit their misdeeds in the mountains, the latter in Rome." The satirists even accused some physicians of theft while visiting their patients, e. g. of breaking out the precious stones forming the eyes of statues etc.

Of course the dear public bore then, as it bears now, a great share of the blame of these lamentable errors; for Galen says further: "The public call not the best physicians, but rather those who humor their caprices. Where no thought is given in the choice of a physician to any difference in individuals, but the good and bad pass for equals, there each physician keeps mainly in view what he may acquire without labor, and what offers a prospect of gain." The public loved too what it could not understand: "People who understand no Greek place no confidence in a physician who does not practise his art in the Grecian style; indeed they have less confidence when they understand what serves to cure them" (Pliny.)—just as with us!

How the public of that day was cajoled may be inferred from the following account of the same author, who was, however, by no means a cool and unprejudiced judge: "Under the reign of Nero the whole world went over from Vettius Valens to Thessalus, who discarded all preceding prescriptions and wrathfully inveighed against the physicians of every age; with what discretion and talent may be seen from the fact that he called himself upon his tomb-stone the "Conqueror of physicians." No charioteer or play actor had so great a following upon the streets. Then Crinas of Marseilles got the start of him, while, under the guise of greater carefulness, he combined medicine and astrology, and devoted attention to the hours. These men guided Rome, until suddenly Charmis of Marseilles invaded the city, and not only condemned the earlier physicians, but also their warm baths, and prescribed cold

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stamps have been found were mostly dealers in ophthalmic remedies, probably the agents of physicians. (Baas.)

The "collyria" of the Ancients were of the consistency of our extracts or soaps, and bore like our toilet soaps, the stamp of the proprietor or inventor. The vessels in which these collyria and eye-salves were stored, and even the remedies themselves bearing the stamps in question, have been found in great numbers in Germany, England and France, most frequently in localities where permanent camps of the Roman legions are known to have been situated. As an example, I quote from Haeser: C. CINTVSMINI BLANDI EVVODES AD ASPR. (Caii Centusminii Blandi Euodes ad aspritudinem). (H.)

lotions even in the middle of winter, having the sick dipped into the lakes. And there is no doubt that all these physicians desired to gain reputation by novelties, and thus tampered with our lives. Hence, too, their lamentable quarrels at the sick bed, where none of them hold the same opinion for fear of appearing the follower of some one else. Daily is this art changed" (as was said also by Gutzkow), "and it is certain that as soon as one of them is skilled in oratory, he becomes at once the arbiter of life and death among us."

Besides the persons already mentioned, doctresses and midwives also practised medicine, and the latter at an early period even exercised official functions as experts before the courts. In this event five midwives were summoned as a jury, and three brought in a verdict. In difficult cases physicians might also be called in, but as a rule the midwives alone attended even the worst cases. In later times the latter formed a guild. Innumerable bath-keepers (to whom the physicians not infrequently abandoned entirely chronic cases), barbers, gladiatorial physicians (iatroliptæ, aliptæ), theatrical physicians, magicians and exorcists (who were not, however, considered physicians) etc., dabbled in medicine in all possible and impossible ways — exactly as they do with us.

Ignorant physicians decorated their shops and boxes with all sorts of trifles in order to attract the masses; others even invited patients in from the streets (hired servants attend to this business now-a-days). Charlatans operated upon a kind of stage (as is done to-day in Italy by the itinerant successors of these lower physicians), and carried these stages about with them, as was done as late as the last century by Dr. Eysenbarth & Co.—an evidence that antiquity furnished the classical model for this custom.

The honorarium of the physician for an ordinary visit amounted to about 29 cents, though, according to Pliny, competition frequently reduced the fee. Still distinguished physicians in special cases received such fees as Pope Pius IX. was able to pay out of his Peter's pence, but are not met with to-day among private individuals even in England and America. Thus Galen for a single case received a fee of $2100, while others, like Crinas of Marseilles, were able to acquire such wealth that they furnished cities with walls — such parties with us would provide themselves rather with fireproof safes — and yet retained more than half a million dollars! The surgeon Alcon under Claudius was able, and was compelled, to pay a fine of more than half a million dollars, and yet soon made up the sum again. From such instances (which were, however, quite exceptional) the old saying "Galenus dat opes!" may have had its origin. A large number of physicians, however, must have lived in poverty and even absolute want. This may be inferred from the system of robbery which Ulpian was forced to oppose in his ordinance providing that a physician, who by his treatment had exposed any one to the danger of losing his sight or similar injury, and should then persuade the patient to sell him any of his property below its actual value, on condition that he should cure him again, should be compelled to disgorge all his plunder! The wealthy had their family physicians who enjoyed a high salary, payable usually, like medical fees in general, on the first of January.

The deportment of physicians was the same that it has ever been, even down to our own day. Some cringed in apparent humility, others strutted in ostensation; some behaved rudely and smelt of wine and onions, as e. g. Quintus; others, and undoubtedly many, behaved worthy of their high calling. Yet of these latter history always takes less notice than of the excesses of the bad!

Each cohort (420 men) employed four military physicians,[1] whose pay consisted partly of money, partly of natural products. According to other authorities, however, each legion of ten cohorts had one legionary physician, and only ten cohort physicians. The latter ranked as subalterns. In the navy also there was one physician to each trireme. A few of these navy physicians (and probably of the cohort physicians also) received a double salary, as a distinction and reward of merit. The administration of the army hospitals was assigned to proper officials (præfectus castrorum, tribunus, comes), to whom the physicians were subordinate. Still there were no field-hospitals in our sense of that term. The badly wounded were placed in tents in the camps (valetudinarium),[2] and there were also bathing establishments for the soldiers. The wounded, when it was possible, were carried to the neigboring cities, after having been borne immediately into camp. Each soldier carried with him the most necessary bandages already prepared for use, an arrangement which we have only recently adopted.

The Romans had already observed that military service contributed to health: "Expert military men are of the opinion that daily exercise contributes more to health than all physicians."

In early times medical instruction was imparted by individual physicians in return for a certain specified honorarium. Subsequently the instruction was given chiefly by the archiatri, and in their (guild) colleges, which served as the model of the guilds of the surgeons etc. in mediæval times. Students were also educated in the higher schools, which first arose in Rome during the reign of Nero, but existed too at an early period in the provinces (at Marseilles in Gaul etc.). Pure medical schools, however, did not exist among the Romans. Alexander Severus gave a salary and lecture rooms to the medici scholares (professors). The latter often took their pupils with them to their bedside, and this custom gave occasion for the satirical complaint to which Martial gave utterance:

"Languebam, sed tu comitatus protinus ad me
Venisti, centum, Symmache, discipulis;
Centum me tetigere manus Aquilone gelatæ
Non habui febrem, Symmache, nunc habeo."[3]

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[1] Not, however, until the beginning of the Empire.

[2] Valetudinaria were established as soon as five or six legions were associated in service. They were placed on the left of the porta prætoria, and were 60 feet square. Bathing facilities were only exceptional. (H.)

[3] —
"Faint was I only, Symmachus, till thou,
Backed by an hundred students, throng'dst my bed;
An hundred icy fingers chilled my brow;
I had no fever; now I'm nearly dead!" (H.)

As a rule the physicians visited their patients, though the slightly indisposed also went to the offices of their medical advisers. Famous physicians gave consultations in writing, and even furnished medicine to patients in foreign countries, as we shall see done also at a later period. The physicians often publicly defended their views and prescriptions when these were attacked by their good colleagues, a custom which depended upon the general publicity of ancient life as compared with our own, which is passed so largely within the limits of four walls. Thus Galen e. g. and his pupil Teuthras catechised each other on such occasions, and our modern journalism would have made brilliant use of these medical discussions. Among the Arabians too at a later period physicians and savants furnished striking examples of this learned logomachy.

Hospitals for slaves only (valetudinaria and veterinaria) were to be found upon farms, and probably also in the city, in the days of the Republic and the first emperors. These, however, were maintained simply for the purpose of protecting their proprietors, as far as possible, from pecuniary loss, and not from motives of charity, a sentiment which first manifested itself in the erection of such institutions during the times of Christianity.[1] Upon the estates the "Vilicus" or "Vilica" had the oversight and the distribution of the sick, though the proprietor himself was often the physician. During the decline of the empire no physicians, of course, took care of the many children who were exposed. Nerva (A. D. 96–98), however, had inaugurated antique foundling asylums, in which the annual cost of individual maintenance amounted to about $7.50. Antoninus too had constructed a hospital for parturient women, a sort of lying-in-hospital and home for convalescents combined. This was located in Argolis. (See Lerch, "Geschichte der Balneologie", p. 118.) Hospitals proper, therefore, in our sense of the term, did not originate until Christian times; for the Romans—probably with some justice, in consequence of the violent separation of the sick from their ordinary relations and conditions of life—regarded such institutions as inhuman, even in periods when epidemics prevailed. Public hygiene, as we designate it to-day, was placed in charge of the ædiles, who were provided with the most absolute authority. It was their duty to look after the aqueducts, drainage (e. g. of the Pontine marshes, where remains of works supposed to have been constructed before the Roman age have been recently discovered), the building of cloacæ or sewers and their preservation, the sanitary condition of the streets and houses etc., for which objects they provided immense means, chiefly from their own private purses. We have no information as to whether they called in physicians for advice, but it is improbable, for no employment of physicians by the state for sanitary or legal purposes, as experts before the courts etc., was introduced among any of the nations of antiquity. The baths, which were in almost daily use among all the Ancients, and were also retained throughout the whole Middle Ages, must be considered institutions of public hygiene, inasmuch as their building and maintenance were chiefly provided for by the treasury of the state or municipality, and they were therefore under governmental oversight (except in the matter of morality). This is true especially of the time when oriental manners had not yet corrupted the Romans, as they did under the Empire, and when the baths retained their simple character, instead of being artistically decorated places of rendezvous for men and women. A bath cost about half a cent.

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[1] Christian institutions of charity and hospitals, though actually originating in the later periods of Antiquity, we shall present in our description of the Middle Ages. For in spirit they belong entirely to this period, and are absolutely without any intimate relation to Græco-Roman antiquity. Even in point of time, it is only their earliest development that can be assigned to Antiquity.

Pharmacies and apothecaries equivalent, or similar, to ours of the present day did not exist among the Romans. Even the most distinguished physicians prepared their own medicines, or at least kept them on hand.

These medicines bore labels, which made known the name of the drugs, the directions for their use, the diseases for which they were designed, and the name of the inventor, in which respect they filled, in some degree, the place of our modern advertisements. The physicians had too their own boxes for medicines and medical weights, which were often beautifully decorated.

Indeed they often collected drugs for themselves (as e. g. Galen), in order to have them genuine. The selection and preparation of drugs was indeed one of the most important duties of the earlier physicians. The most expensive drugs were then too regarded as most efficacious. The Seplasiæ and Seplasiarii[1] dealt only in drugs and the ointments used in the daily baths. The ordinary simple internal remedies were prepared at home. In the later days of the Roman Empire, however, special formulæ like electuaries (electuaria), eye-salves and lotions (collyria), plasters (emplastra) and emollient poultices (malagmata), were kept and adulterated (for there was no oversight of the matter by the state) in the officinæ of the Seplasiarii. "Apotheca" at this period signified a wine-room, though not in the euphemistic sense of the term employed to-day.[2]

"The physicians — many scarcely know the names of the drugs — trust to the Seplasiarii, who always adulterate their medicines and sell old plasters and collyria and drugs spoiled by age."

Even the same Pliny, who had a genuine hatred for physicians and tradesmen, and is not therefore a reliable witness, but seems rather to have been a scandal-monger, names the latter class flatly—poison mixers (medicamentarii). The same statements apply to the terms Pharmacus and Pharmaceutria, which designated male and female poisoners, sorcerers and sorceresses.

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[1] The grocers and sellers of toilet-articles among the Romans.

[2] The "apotheca" was a room in the upper part of the house, in which the amphoræ were stored. No Roman kept his wine in a cellar, as we employ the term. Even the "cella vinaria" was above ground, and an ancient Roman brought *down* his wine, instead of bringing it *up*, as we do. (H.)

Pharmaceuta, on the other hand, was the title of one who occupied himself with the healing art and the preparation of drugs. The Pharmacopolæ (who may be considered as about equivalent to our apothecaries) sold simple drugs and also put up prescriptions. They travelled about from place to place, and among the Romans passed for charlatans and mountebanks "to whose words we listen, but to whom no invalid trusts himself."

Besides the persons already mentioned, the so-called Herbarii also furnished physicians and the public with drugs. Under this title were understood those who gathered and dried the drugs in question, or reduced them to a salable form. On the other hand, the Pharmacotritæ corresponded to our drug-powderers of to-day, but were in ancient times an independent trade.

The price of drugs was in some cases very high: thus 500 grammes of the balsam of Gilead cost at the place of collection about $54, in Rome $187: 500 grammes of nard leaves, $7.50–$14: 500 grammes of spike of nard, $19: 500 grammes of oil of the folia malabathri, $75: 500 grammes of pepper, $0.75–3.00 etc. (Marquardt, Roem. Privatalterthümer, 1867.)

On the whole, the reputation of all the last-mentioned branches of business was very equivocal, since all, without exception, dabbled occasionally in the sale of poisons etc., and especially in those abortive remedies which prevented Roman wives and maidens from becoming mothers, whether within or without the bonds of matrimony. In addition, they had a monopoly of the treatment of secret diseases. The annual income of some of these fellows frequently amounted to as much as $12,000–24,000. The position of the true physician, in contrast with that of such characters, Galen, however, considers quite regal, for he compares the former to an architect, while the latter are placed in rather disreputable company.

"As he stands in comparison with the carpenters, laborers and tradesmen, so the physician stands in comparison with his servants, the rhizotomists, ointment-makers, cooks, plaster-spreaders, poultice-makers, administrators of clysters, bleeders and cuppers."

The worst sort of drug-sellers in Rome, however, were without doubt the "Medicæ", usually old prostitutes,[1] and the "Sagæ", who treated the diseases of women and prepared love-philters and abortive drinks, and murdered and exposed children.

In times of the greatest corruption their commissions for the latter business were especially frequent. Among the Greeks and Romans the life and death of children rested upon the authority of the parent, a barbarity which Christianity was the first to set aside. Gangs of these medicæ and sagæ were especially numerous in the degenerate age of the empire, and pandered to the most shameless and vicious desires of the corrupt circles of the court world. They practised the introduction of tampons for the prevention of conception (a custom recently preached up among us on neo-century A. D.), whose treatise "On the Parts of the Human Body", according to E. J. Zarncke, is taken from Rufus, the first chapter, with the exception of a few passages, being the entire work of the latter.

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[1] The number of meretrices in the later days of Rome was very great. They were to be enjoyed at rates varying from one cent up to $375 *pro dosi*, according to their beauty, youth etc. From the time of Caligula a tax was laid upon this rofession, a fact which the popes in later times recalled to remembrance.

The fewer the new discoveries made at this period in the department of anatomy, the more were novelties invented in materia medica and pharmaceutics, always a sign that a true comprehension of the essentials and capabilities of practical medicine has been lost. Medical art was looked upon as a matter of business, promoted especially by new remedies — just as it is now. At this period all therapeutic efficiency was denied to nature and transferred to the province of art; for the golden saying of Hippocrates, "Natures alone heal", had been long forgotten, and, indeed, never had any deep significance save to a few! The thougthless crowd either quietly accepted the "new remedies", or a venal band of claqueurs disseminated them or trumpeted abroad their merits, exactly as they do to-day, save that at this period this could not be done by grandiloquent advertisements in the columns of the political and medical journals, which, as we all know, can deny their responsibility in virtuous and precise terms, without, however, renouncing the profit accruing from their want of principle. To add to this lack of insight and judgment the further element of stupidity, the descriptions of these remedies are often presented in verse, as to-day they are displayed in special forms of type. Such practices brought honorable science, then as now, into contempt, with the difference again that this feeling then found its expression not in the Imperial Diet, but, as we shall see, in learned compilations by the laity.

A few persons among the Romans wrote at an early period on the subject of medicines, either in special treatises, or incidentally in other works. Among these may be mentioned Lenæus, a freedman of Pompey; C. Valgius Rufus (B. C. 12); Æmilius Macer, senior (died B. C. 15); M. T. Varro (B. C. 116–27); Menius Rufus (who invented a favorite "Hiera", an antique counterpart of our Vienna potion), a contemporary of Celsus; and Apuleius Celsus under the reign of Augustus. In the time of Pliny a physician by the name of Castor also possessed a botanical garden.[1]

Other more important, or rather more famous, pharmacologists of this period were:

PAMPHILUS MIGMATOPOLES (between A. D. 14–38), author of a book "On plants", displaying neither originality nor critical acumen, and full of superstition. However, he acquired great wealth by a remedy for mentagra.

HERENNIUS PHILO of TARSUS (about A. D. 20), inventor of the "famous" Philonium (for colicky pains), the description of which in verse is still extant. Under Nero lived

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[1] Among the physicians already mentioned, the following, as we have seen, occupied themselves with the subject of pharmacology: Sextius Niger, Julius Bassus, Andromachus the Elder, Petronius Diodotus, and Petronius Musa, Niceratus, Scribonius Largus and Antonius Pacchius (about A. D. 20), a physician mentioned by Scribonius.

SERVILIUS DAMOCRATES (about A. D. 25),
who described in iambic verse many compound remedies, such as malagmata, acopa, antidota, tooth-powder, plasters etc.

The most important pharmacological writer of antiquity, who, like Galen, Ptolemæus and other historically important characters among the Ancients, enjoyed the highest esteem as an unsurpassed scientific "authority" among the Romans, as well as during the whole Middle Ages and even into modern times, was, however,

PEDANIUS DIOSCORIDES (A. D. 40–90) of Anazarba (later Cæsarea Augusta in Cilicia).
an independent investigator and writer upon the medicines employed at that time, drawn from either the animal, vegetable or mineral kingdom. Ancient physical science embraced little but these three branches: for the Ancients knew very little of physics, inasmuch as they did not experiment (except in physiology) —Dioscorides recognized about 400 plants, Galen as many as 600, Ebn Beithar 800, Linnæus about 9,000-10,000, and to-day we know more than 100,000 species. Dioscorides had travelled extensively in Italy, Gaul, Spain, Germany, Greece etc. Many of his medicines are still in use to-day, while others have become obsolete, and still others belong to the superstitions which were current in the author's age. We may mention as examples: whey, ox-gall, aloes, fern, cinnamon, castor oil, sugar (a favorite remedy later with the Arabians), quicksilver, white lead, blue vitriol (the chemical preparation of which in special apparatus is partially given), rennet, mandragora (as an anæsthetic) bugs (in intermittent fever), the grimy sweat of gladiators and bathers etc. He makes known also the current adulterations of the medicines of that time

TIBERIUS CLAUDIUS MENECRATES (about A. D. 34), of Zeophleta,
was physician-in-ordinary to the emperor Tiberius, and inventor of the diachylon plaster (the name, though not the precise composition, of which is preserved in our plaster of to-day), and many other compounds. His recommendation to employ actual figures in the designation of weights in prescriptions, instead of arbitrary signs, was very judicious, though it was not complied with until the middle of the present century. He wrote, besides many (155) other works, a treatise on pharmacology with a bombastic title, dedicated to the emperor.

ANDROMACHUS THE YOUNGER (about A. D. 54).
like his father physician-in-ordinary to Nero, gave an account of many drugs; among others of 24 remedies for ear-ache, remedies for bleeding, tooth-ache etc., and plasters with high-flown titles.

XENOCRATES of APHRODISIAS (about A. D. 70),
was author of a treatise on food drawn from the class of fishes, and (like the Isopaths a short time ago, and Prof. Yeager at the present time) introduced disgusting filth as "medicines": e. g. ear-wax, menstrual blood, human flesh, bat's blood etc.

APOLLONIUS ARCHISTRATOR of PERGAMUS (about A. D. 80),
was the inventor of some remedies for the hearing and the like, and observed cases of cerebral inflammation resulting from insolation.

ASCLEPIADES PHARMACION (about A. D. 100)
recommended even animal excrement as a medicine, and many other "remedies."

On the other hand **KRITO**
more elegantly occupied himself with the invention of cosmetic preparations, to which he (as is customary too to-day) gave magnificent names, such as "The incomparable remedy" etc.

As an author on subjects of natural history and the healing art we must at least mention here the panegyrist of medicine and friend of physicians Lucius Annæus Seneca (A. D. 3-65). who has often interwoven in his writings maxims relating to physical and mental diet, remedies and diseases.[1]

Caius Pliny the Elder, of Como (born A. D. 23, died at Stabiæ, in an eruption of mount Vesuvius, Aug. 22d., A. D. 79),

that scorner of doctors and thorough-bred aper of Romanism of the type of Cato. deserves, however, special mention. Like Celsus, a savant and encyclopædist of enormous endurance, he was not always, like him, correct in his judgment. As a writer he has little command of language, a defect which he strives to replace by far-fetched and obscure modes of expression. This latter defect is also manifest in Sallust and Quintilian, a sign of the declining taste and intellectual exhaustion of the Romans. Mannerisms of expression and enigmatical obscurities were sought after, to serve as a kind of pepper and impart savor to the intellectual diet. Pliny too was one of the few ancient authors who was zealously studied in the Middle Ages, and his work formed the sum and substance of all knowledge of the natural sciences during this period. He wrote his Historia Naturalis, which is compiled from 2000 different works, in two years (A. D. 77 & 78). It contains nothing original relative to the drugs and medicines which are discussed. It is worth mentioning that he knew cataract, membrana pupillaris, coloboma and mydriatic remedies. (Panas). The following passages may serve as examples of his hatred against physicians.[2] "And there is no doubt that they all busy themselves with our lives, in order by the discovery of some new thing or another to win reputation for themselves. Hence flow those pitiable disputes over the sick; for no one has the same views as another; hence also that inscription upon the tombstone of the unfortunate victim: "He died by reason of the confusion of the doctors." This spurious art is changed so often and so lamentably, and we are driven to and fro by the breath of the spirits of Greece." "There is alas, no law against incompetency no striking example is made. They learn by our bodily jeopardy, and make experiments until the death of the patients, and the doctor is the only person not punished for murder."

Examples of what he discovered and handed down to posterity: "As regards the menstruation of females, rarely can anything be found more peculiar and dreadful in its results.[3] Wine which has not ceased fermenting becomes sour (a maxim firmly believed by the common people to-day in France and on the Rhine!). Dogs who lick up menstrual fluid become mad. Ants cast away their store of food if a menstruating woman comes in their neighborhood" — clear evidence that Pliny himself was no observer, but related what he read without criticism. Of course he does better in medicine, especially as regards plants and medicines. The description of a kind of spectacles has been also claimed for him ("Nero princeps gladiatorum pugnas spectabat in smaragd"), but in our opinion the passage merely implies that the blasé tyrant looked at the proceedings through colored glass Pliny must have been acquainted with the treatment of corpulence, for he says that he who wishes to become stouter and more corpulent should drink during his meals, while he who desires to become thinner should not drink either during or after meals. He prefers sea voyages (common even in that day), with subsequent residence in Egypt, in the treatment of diseases of the chest, to a residence in the resinous atmosphere of pine woods, an opinion in which he is opposed to Celsus.

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[1] He already made use of the expression that the Romans were perishing of too much literature. What would he say of us?

[2] Yet when he himself was sick he called in a physician, and even recommended him to Trajan as a candidate for citizenship.

[3] Dr. Theodor Clemens, of Frankfort on the Main, considers menstruating women disseminators of bacilli.

The most important Roman author on medical subjects, and a compiler of a much higher order in his eight books "De Medicina", was AULUS CORNELIUS CELSUS (between B. C. 25–30 and A. D. 45–50). He had also written on philosophy, oratory, jurisprudence, history etc., and was in fact an encyclopædist. Though not a physician by profession, he was able to write and to think on medicine quite like a regular practitioner, so that his work may claim the value of an original treatise on medicine. In this he was aided by a rich experience in practice, acquired in his own valetudinaria. This too placed in his hand (which a healthy skepticism well suited) a guide for the exercise of criticism on physicians and medical art—a faculty which he exercised with much more justice than Pliny. In addition to such excellencies he enjoyed also the command of a language, which differed but little from the best examples of Latinity.—How nicely he weighed even single words is shown sufficiently by the one sentence: "Ut alimenta sanis corporibus agricultura, sic sanitatem ægris medicina promittit."

His judgment as to the power and the limits of medical art, as well as his knowledge of human nature, stamp him a born physician.

"The failings of those who practice medicine are not to be charged to the art itself"—"It is their confidence in medicine which is very frequently, indeed most frequently, of advantage to the sick."—"It is the sign of a prudent man not to undertake the treatment of one who cannot be cured, lest he gain the reputation of slaying him, whom his own fate is dragging down." — "The physician of experience is recognized by his not at once seizing the arm of his patient as soon as he comes to his side, but he looks upon him, and, as it were, sifts him first with a serene look, to discover how he really is; and if the sick man manifests fear, he soothes him with suitable words before proceeding to a manual examination."—"Little minds confess nothing disgraceful to themselves, for they have nothing to lose: But to a great mind it is befitting to acknowledge even mistakes, especially when the results of medical practice are handed down for the benefit of posterity." (See Haeser.)

His descriptive and operative surgery (including also operative dentistry) is considered the best contribution of Celsus to medical art. It must still be regarded as a "masculine" branch, in comparison with the salve-surgery which came into vogue at a later period. It gives us too the best idea of the eminent services of the Alexandrians, who furnished the substance of surgical art.

The qualifications of the surgeon, according to Celsus, are a firm, steady hand, the ability to use either hand equally well, youth, or at least an approximation thereto, a sharp eye, lack of timidity and compassion, so as not to be moved by the outcries of his patient, not to hurry more than the case admits, and not to cut less than may be necessary, but to manage to the very end as if entirely unaffected by his cries.

He describes, on the one hand, a large number of surgical ailments, such as diseases of the joints and the bones, wounds, tumors, burns, fistula, abscess, sprains and luxations, for which he recommends reduction before the development of inflammation; fractures, in which, when they fail to unite, he recommends extension and rubbing together the ends of the bone, and even cutting down upon the bone so that it heals as an open wound; hernia, which he thinks originates in laceration of the peritoneum; strangulated hernia, where he cautions against cathartics; the radical operation for reducible hernia by turning up and casting a ligature about the neck of the sack, or compression of the latter until necrosis takes place (in large and strangulated herniæ he does not approve of any operation); foreign bodies in the ears etc.: on the other hand he notices many operations of the Ancients, some of them handed down to us by him alone, among others: bleeding, double ligation of bleeding vessels and division of the vessels between the ligatures, lithotomy (he recommends bimanual examination from the belly and rectum to determine positively the diagnosis of stone) even in women, castration, amputation in the sound flesh with a single circular cut (in gangrene only, a rule which prevailed throughout the whole Middle Ages down to the 17th century), which he is the first among the Ancients to describe unequivocally, catheterization, repair of defects of the nose, lips, auricles and prepuce[1] (including the not easily explained infibulation, so-called), trepanning, the operative treatment of goitre, scleroticonyxis in cataract (which he ascribes to coagulation of the humors in the pupil), resection of the ribs, enemata (with the view too of artificial feeding), diseases of the ears (which he only among the Ancients discusses, and in which he recommends the ear syringe), extraction of teeth by means of forceps, fastening teeth with gold wire, bursting hollow teeth by peppercorns pressed into them etc. The results of extraction in cases of anchylosis of the teeth and alveoli, caries and necrosis, are known to him, and the tooth was accordingly shaken loose most painfully before application of the forceps. In the treatment of wounds he recommends ripening, styptic and caustic remedies, but declares rest the best remedy of all.

His operative midwifery (discussed together with surgery) is, on the other hand, meager, and his method of extraction by means of hooks, after the employment of version by the head or foot (in dead children), is rude. The latter operation he employed in transverse presentation, and aided the subsequent extraction by external manipulation, a method, which quite recently has been commended as very effective and good. He was also acquainted with the conversion of breech into footling presentations. In presentation of one foot he cuts this off. He was also acquainted with decapitation! Celsus distinguishes among mental diseases three varieties of phrenesis. He also speaks in favor of coercive measures in the case of the violently insane, but says that each case must be individualized. Sleep, which is usually absent, must be compelled, if necessary, by narcotics. Raving maniacs he considers more difficult of cure than those more quietly insane. In the treatment of diseases of the eyes he advises the employment of the milder remedies, instillations, salves, etc., the more severe the inflammation may be.

That he was also well versed in practice may be inferred from his remark, that it is the part of a theatrical performer to display great activity in small matters, in order to give the impression of having been of great service. He recommends the physician to wait a few moments before feeling the pulse, and meanwhile to quiet the patient by a cheerful air. His pictures of internal diseases are clear, and some of them are preserved to the present day (area Celsi, kerion Celsi). He is also the first to distinguish hallucinations of vision. His natural dietetic prescriptions and simple therapeutic measures (in which he often mentions Asclepiades), as well as his semeiology and prognostics, both of which are based upon Hippocratic principles, have especial value. As an example of his clear method of description we quote the following passage: "This instrument (the catheter) is necessary not only in men, but also occasionally in women. In order that it may fit everybody, whether small or large, the physician should have three sizes for men, and two for women. The largest size for men should be 15 inches in length, the medium 12 inches, and the smallest 9 inches. For women the larger size should be 9 inches and the smaller 6 inches in length. The instrument should be curved slightly (especially the male variety), and as smooth as possible, and neither too thin or too thick. The patient should be placed supine upon a bench or couch, as in the treatment of diseases of the anus. The physician standing upon his right side grasps with his left hand the penis, and with the right introduces the instrument into the urinary passage. When the catheter has reached the neck of the bladder, it, with the penis, is to be depressed and the point pushed into the bladder, and after the evacuation of the urine it is to be withdrawn."

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[1] Among the Jews who desired to evade the taxes imposed upon them, or to obtain office among the Romans, which they could not do without a prepuce.

In this work of Celsus much of the substance of the lost writings of ancient physicians, and especially those of the Alexandrian age, is preserved. He has manifestly selected from these with ripe judgement only what is reasonable, useful and valuable, and accordingly has paid comparatively little attention to opinions and theories, a point in which he contrasts strongly with Galen, and which impresses upon his work the stamp of practicality and usefulness.[1]

4. THE PNEUMATIC SCHOOL,

in opposition to the humoral theory of the "Dogmatists" and the solidism of the "Methodists", introduced the aëriform, spiritual principle of the "pneuma" (the world-soul of the Stoics, especially of Zeno, their chief) into their general pathology. Yet they also left the elementary qualities (warmth, coldness, moisture and dryness, which according to their doctrine may be seen and felt, and not recognized simply by their effects) a place in their "System". The pneuma comes by the way of the respiration, as a part of the creative "World-soul", into the heart, and is driven thence into the vessels and the whole body, in which it effects in a passive way the diastole of the pulse, while the contraction of the arteries is an active process. When it works regularly and is united with warmth and moisture, it occasions health; under contrary circumstances, and mixed (crasis) with warmth and dryness, it occasions the acute diseases; while mixed with cold and moisture it produces the phlegmatic diseases, and, finally, with cold and dryness — melancholy. This latter condition in its acme introduces death, a state in which everything becomes dry and cold. Moreover the Pneumatists assume predisposing and transient causes of disease, and for all febrile diseases a corruption of the humors, which they named "putrefaction."[2] The hard pulse is inseparable from all fevers. They also—as is

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1. The physician Celsus must not be confounded, as has been done occasionally, with the Epicurean Celsus, who lived under Hadrian and was stigmatized by Origen as an enemy of Christianity.

2. The putrefactive process during all antiquity, and even into modern times, was regarded as the cause of origin of organized or living beings. Conversely we nowadays regard organized beings as the cause of putrefaction.

conceivable in such a system — held dialectics to be a necessary part of the medical art. In fact so firm was their faith in this branch, that in their practice treason to their native land was to be expected rather than an abandonment of their dogmas. By means of dialectics they built up in the most subtile way the doctrine of the pulse, which, as we have already said, they referred to the influx and efflux of the pneuma into and out of the heart (or lungs) into the vessels.

According to the doctrine of the Stoics force and matter are inseparable. God controls the world, and is present in the whole universe. He permeates this as a warm halitus, which, in the formation of the world, separated into air and water. The soul is God, or the warm halitus within us, and is mortal, but survives the body until the conflagration of the world. It is divisible into the five senses, the faculties of speech and generation, and the controlling force in the heart, to which the presidency belongs. Experience arises out of numerous reminiscences. The idea originates in advancing from perceptions to the general, which is an abstraction, for the individual alone has existence—a view affirmed also by the Nominalists and Scholastics. (Ueberweg).

The founder of the Pneumatic school (whose representatives lived between Vespasian and Antoninus Pius, about A. D. 70–160), as well as its only powerful representative, was

ATHENÆUS OF ATTALIA, in Cilicia. He was a famous physician at Rome, about A. D. 69, and turned his weapons first against the views of Asclepiades, but soon fell into hair-splitting refinements, especially with respect to the pulse. To the latter he assigned eight qualities: rythm, fullness, regularity, irregularity, uniformity and uneveness, slowness, frequency, size, force, and named also several subordinate divisions of these qualities. He split up the pneuma into the psychical, the physical and the generative, conformably to the chief functions of the body, but fell into contradiction of his Pneumatic principles in adding to his system the elementary qualities, of which he distinguished warmth and cold as "formative", while dryness and moisture were 'plastic".[1] The same may be said of his assumption of causes of disease in the Hippocratic sense. In conformity with the idea of Aristotle, that substance and form were derived from different individuals, he declared the menstrual blood to be the substantial, and the male semen the formative principle in generation and development. Women have no semen. He concluded further that the female testicles, the ovaries, inasmuch as the woman has no semen—the fluid secreted by the female sexual organs was a sort of local perspiration, the result of the violent movements and friction during coitus—are superfluous organs, exactly like the male breasts, and like the latter exist merely for symmetry. In dietetics he followed good principles. He recommends as remedies, cold and warm baths; amulets in headache; human milk in consumption. The "Hiera" of Archigenes was particularly famous as a remedy to purify the head, stomach and all the humors, and consisted of colocynth, squill, euphorbium, gentian, opoponax, and theriaca, aa 20 grammes, and about 600 other drugs! Venesection he performed only in diseases attended with too much blood, and in these he never pushed it to syncope. Moreover he was solicitous for public hygiene, published methods for the filtration of drinking water, and made observations on the situation of dwellings, particularly as to its influence on health and disease.

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[1] τὰ ποιητικὰ and τὰ ὑλικά. (H.)

Among the famous pupils of Athenæus the very first departed from his doctrines, and was the founder of the so-called

5. SCHOOL OF ECLECTICS,

whose principles are distinguished by its title. The different physicians belonging to this school followed widely differing views. The originator of this so-called "school" was

Agathinus of Sparta (about A. D. 90), who endeavored to combine the views of his master with those of the Methodists and early Empirics. By this process, in the course of time, the "Eclectics" (Episynthetics, Hectics) were formed, a sect which numbered among its members some of the most brilliant medical men of later antiquity.

Of his doctrine of the pulse, which he constructed with much subtility on Pneumatic principles, we know that he ascribed the full pulse to the volume of the inflowing pneuma, while he maintained that one could not perceive the contraction of the vein, and explained the pulsation of the veins by the existence of concealed veins. He spoke earnestly against the abuse of warm baths, prevalent in his day, and advocated the employment of cold baths, as most beneficial to the health.

A pupil of Athenæus was a certain **Theodorus** (the 17th of this name), whose name has been preserved to us by some remedies for tetter. The most famous pupil of Agathinus, however, was

Archigenes of Apamea (A. D. 48–117), a physician of unusual acuteness of mind, which manifested itself in his observations, though, alas, it also degenerated into obscure subtilities. He distinguished himself also as a surgeon.

In surgery he described amputation with preliminary ligation of the main vessel and subsequent cauterization of the smaller ones; wounds of the head; taught the practice of bleeding upon the healthy side, and the employment of caustics, particularly in sciatica. In order to obviate hæmorrhage as far as possible in amputations, he had the skin retracted and then bound a bandage about the limb above the point of operation, something in the style of Esmarch. He warns against operations in patients from whose great feebleness one anticipates an unfavorable result. He does not limit the indications for amputation to gangrene alone, but extends them to such shattering of the limb as will probably result in gangrene, to extensive wounds, cancer and ulcers (Wernher). His disputatiousness may be inferred from his saying that a man should rather betray his country than the opinion of his sect. His admirable gift for analysis appears most brilliant in his divisions of the pulse and of pain. Of the former he assumed eight, depending upon the size, strength, rapidity, frequency, fullness, order, equality and rythm of the pulsations, and in each of these classes he distinguished three varieties: the strong, the weak and the intermediate. Pain he divided into dragging, severe, itching, stinging, writhing, dull, immoderate, cramping, and also falsely professed to determine from these characters the seat of disease. In the doctrine of fever he introduced the so-called epialos[1] and the semi-tertian fever. He also enriched nosognosy by distinguishing sharply sympathetic from primary diseases. In all diseases he assumed two stadia only, that of the acme and that of resolution. He was the first to divide mineral waters, in accordance with their chemical composition, into nitrous, sulphurous and aluminous. In therapeutics he managed empirically, and invented many compound remedies, among others also a so-called hiera.[1]

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[1] A form of fever in which, together with febrile symptoms, the patient also suffers with rigors. (H)

Aretæus of Cappadocia (about A. D. 30–90), shows himself a great physician by his conception, even thus early, of the duties of his profession:

"When he can render no further aid, the physician alone can still mourn as a man with his incurable patient: This is the physician's sad lot", beyond which modern medicine ought certainly to go, since for us, in cases where our technical art fails us, our profession represents a humane, if you will, a Christlike, mission!

But in his observations and the naturalness of his pictures of disease Aretæus also stands high among the ancient physicians; indeed in this respect he resembles greatly Hippocrates, whose dialect, and even mannerisms he adopted. But instead of the simple style of Hippocrates, Aretæus adopted a pomposity and studied conciseness of expression, which corresponded to his age, so intolerant of Hippocratic simplicity. The greater clearness of his pictures of disease, too, was undoubtedly due in great measure to improved views and methods of observation, the result of lapse of time. The appearance of consumptive patients he sets forth in the following clear words:

"The voice is hoarse, the neck slender, the fingers thin, but their joints thick. The bones alone seem to exist, for the flesh is consumed, the finger-nails are curved—for the flesh, which is supplied so plentifully to the fingers, serves as a support to the nails. Those who have a slender build, a breast like two boards joined together, shoulder-blades projecting like a bird and a prominent pomum Adami, have a predisposition to this disease."

In this pointed, though plastic style, he distinguishes many diseases, so that even to-day their diagnosis is easy, a remark which is not true of many of the ancient physicians.

So he describes e. g. diphtheria (ulcera Syriaca), paralysis, in which he distinguished the paralysis of sensation (anæsthesia) from that of motion (paralysis proper), and called the mixed condition paraplegia. He knew that injuries of the brain occasion paralysis of the opposite side. He also described hæmoptysis, migraine and cephalalgia, diabetes, diseases of the bladder, aortitis, pneumonia, diarrhœa, gonorrhœa, fluor albus, elephantiasis, jaundice (which he ascribed to stoppage of the biliary ducts), epilepsy (even that occasioned by lead poisoning). Mental disturbances he divided into mania, melancholia and settled insanity, a division which all following ages have not essentially improved. In all his delineations of disease he, after the example of Hippocrates, takes into consideration the constitution, the age, the season, and the situation of the place. To each section of his work he prefixes an anatomico-

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1. A physician Hermogenes also belongs to this sect. Martial (A. D. 40–100) says of him: "Andragoras bathed and dined with me cheerfully, but the next morning he was found dead. Can you tell me, Faustina, the cause of his death? He saw in his dreams Hermogenes, the physician."

physiological introduction concerning the part of the body whose diseases are to be considered (in the style of many of our modern text-books), and exercises a sharp criticism founded upon his own observations. In anatomy he does not differ greatly from the views of his time. Still we find in his work intimations of the tubes of Bellini, while he may possibly have had a correct idea of the decussation of the nerves and of the Hunterian decidua also. He knew that the tongue was composed of muscles. In physiology he, with Aristotle, regarded respiration as the process by which the pneuma reached the lungs, and thence the heart, the seat of life. The blood was prepared in the liver, the bile in the gall-bladder; in the large intestine a secondary digestion takes place; in the spleen is to be found thick, coagulated blood; the seat of the soul is in the heart. He knew that the contents of the arteries was light-colored, that of the veins dark. In therapeutics he recommended in general proper dietetic, and mild medical, treatment, but did not shrink also from more powerful drugs, like elaterium, hellebore etc., and he employed without hesitation emetics, bleeding (upon the diseased side in the outset of the disease—pleurisy—), leeches, blisters, and even the actual cautery. The slight success of tracheotomy was known to him, and he defended good principles in his treatment of the insane. In chronic diseases he was fond of giving castoreum. Two of his works are still extant, viz: "De causis et signis acutorum et diuturnorum morborum," and "De curatione acutorum et diuturnorum morborum."

Herodotus (about A. D. 100),

a pupil of Agathinus, wrote on certain acute infectious exanthemata, which have been interpreted as small-pox (also measles, petechiæ), and also upon verminous diseases. He is the first to mention pomegranate root as a remedy for tapeworm. In therapeutics he laid especial weight on the diaphoretic method, and recommended hot sand-baths, oil-baths and baths in sea and mineral water. A famous surgeon was

Heliodorus (about A. D. 100),

who has left some fragments upon amputation without ligation of vessels. He recommends the division of the skin of the leg in front, and the sawing through of the bones, before dividing the vascular soft parts on the back of the leg. The hæmorrhage is then to be stopped by a firm bandage. He discards chopping off limbs, and declares amputation through and above the knee and elbow joints very dangerous, an idea which maintained currency down into the 17th century. Supernumerary members he removed by double circular section. (Wernher). He describes trepanning and its after-treatment, caries and necrosis, injuries of the head, exostoses and fissures of the skull, and their treatment.

Cassius the Iatrosophist (about A. D. 130)

discusses in 84 sections, eclectically and in accordance with various "systems", his "Medical Questions".[1] Some of these are treated with considerable judgment, e. g. those relating to metastatic abscess of the parotid, sympathetic affections of both eyes, the erysipelas of wounds, the secondary swelling of glands (for instance those of the axilla following ulcers upon the hand), the formation of callus etc. Other questions receive a comical treatment, e. g. sneezing, which, according to Cassius, takes place twice in succession—because man has two nostrils!)

Philip of Cæsarea (about A. D. 117)

is considered a zealous follower of Archigenes. He wrote about medicines, catalepsy and consumption, in the treatment of which he discarded the use of baths.

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[1] "Questiones et Problemata", or in the original Greek *Ἰατρικαὶ ἀπορίαι καὶ προβλήματα φυσικά.* (H.)

The greatest of the Eclectics, however, was

Claudius Galen

of Pergamus[1] (A. D. 131–201 or 210), who, though he did not consider himself an Eclectic, and is not usually classed as such, yet distinguished himself above all others by advancing a complete "Eclectic System" of his own—a system which for more than a thousand years enjoyed undisputed sway.

Galen was in the medical, as Aristotle in the philosophical, department the leading lawgiver of both Christians and Arabians during the whole Middle Ages, and he has therefore attained the widest importance of all the ancient physicians. "He belonged", as Schlosser says, "to a period, in which, as in all times of laxity and over-refinement, the institutions of instruction were excellently arranged, instruction was learned and profound, and the struggle for those branches of knowledge, which every man of breeding was expected to possess, was generally diffused. Hence much attention, indeed, more attention than at other times, was bestowed upon those branches which demand no flight of fancy, no independence of mind, but which offer immediate profit. These branches, as we know, are the mathematical, medical, physical, geographical and legal sciences. In after ages Galen's influence, not only as a medical, but also as a rhetorical and philosophical, writer was exercised most beneficially on a class which despised the ancient sources of genuine wisdom, and while it continually preached about supersensible things, of divine revelations and of the renunciation of humanity through monastic discipline, was yet incapable of any genuine enthusiasm. This influence of Galen shows itself particularly in that treatise which bears the title "Suasoria ad artes oratio" and was most frequently read."

Galen was the son of Nicon, an architect, whom he paints as the most excellent of fathers, while he has fixed upon his mother the stain of a second Xantippe.[2] The former instructed him at first himself, as was the rule among the Ancients; for in a few places only were there any arrangements like our primary and intermediate schools. He then had him in his 15th year instructed in the most prominent philosophical systems, and later devoted him to the medical profession in consequence of a dream, a superstitious tendency which explains the same peculiarity in the son. Galen received instruction in anatomy from Satyrus at Pergamus, and in pathology from Stratonicus the Hippocratist, Ennius Meccius, and Æschrion the Empiric. After the death of his father, however, he went in his 21st year to Smyrna where he received further anatomical instruction from Pelops; thence he went to Corinth, where he had Numesianus as his teacher. In order to improve himself also in pharmacology by his own observation, he made long tours in Asia Minor und Palestine, and sought e. g. the jet-stone[3] in in a boating expedition along the entire Lycian

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1. In Mysia, one of the educational and artistic centers of the world at that time.
2. The mothers of great men among the Ancients, in consequence of their want of education, did not and could not have that influence upon the career of their sons, which is so common among modern peoples.
3. Latin "gagates", Greek *γαγάτες*, a stone said to be found in Lycia or Cilicia, which, when exposed to the fire, burns and emits a bituminous odor. It was recommended in epilepsy, hysteria and gout. (H.)

coast. After studying anatomy especially for a long time at Alexandria,— he names as his teacher a certain Heraclianus, and mentions as a piece of good fortune that he saw there a human skeleton — he returned in his 28th year to his native city, and began to practice as a gladiatorial physician. At the age of 34 he went to Rome, where he speedily acquired reputation, especially by his physiological lectures and his practice. Galen fought especially against the school of Methodism, which was the most influential in his day, and in behalf of Hippocrates, who was not in fashion, and he relates how some of his "colleagues" even poisoned each other — a matter limited to glances at the present day! The envy of these fellows drove him, however, from Rome, and with disgust for the practice of his profession in his heart, in the 37th year of his age he went again upon his travels, and returned to his home. After a year, however, he was recalled to Rome by Marcus Aurelius, and returned to the metropolis on foot. When he arrived, he was requested to accompany the emperor in the war against the Marcomanni, but declined the position, superstitiously influenced by a dream, and so became physician-in-ordinary to Commodus. Of his subsequent life nothing is known, though he is supposed to have lived to the age of 70–80 years.

Galen was an author of immense fertility (and not alone in the field of medicine), a fact only partially explained by the circumstance that he began to write in very early youth.[1]

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[1] Of Galen's works there were on philosophical, grammatical, mathematical and legal subjects		125
Of independent medical works still extant:	genuine	83
	doubtful	19
	lost	48
		275
Add thereto:		
Commentaries on Hippocrates		15
Fragments		19
		309
Still unprinted		80
	Total	389

Under Galen's name there exist 45 other writings, distinguished as "spurious".

The most complete edition of Galen's works is that of Kühn in 22 volumes. The most important treatises are: "*De usu partium corporis humani*"; "De motu musculorum"; "De locis affectis"; "De differentiis morborum"; "*De pulsibus*"; "*Ars parva*"; "De ratione medendi"; "*Methodus medendi*"; "*De crisibus*"; "*De differentiis febrium*"; "De sanitate tuenda"; "De compositione medicamentorum"; "De morborum causis"; The commentaries etc.

Those treatises of the preceding list whose titles are printed in italics have been distinguished as the "canonical" writings of Galen, and during the Middle Ages these were first expounded to the students. A complete translation from the Greek of the entire works of Galen has never been made.

In spite of the facility with which he wrote, Galen received but slight honoraria from the booksellers. Martial for the first book of his epigrams received only about 75 cents. On the other hand large bids were made by private individuals: e. g. Pliny was offered $60,000 for his work. Shorthand writers received about 10 cents for each of our pages of the present day, or the same sum per hour. At that period there were booksellers in England, Spain etc., and of course book-fanciers, as well as waste paper (for dealers in fish and sausage).

The philosophico-physiological and general pathological views of Galen are founded upon the four elements, to which are attached the primary qualities: to air, coldness, to fire, warmth, to water, moisture, to earth, dryness. To these correspond four cardinal humors, among which latter the element water predominates in the mucus, which is secreted by the brain; fire, in the yellow bile, which has its origin in the liver; earth, in the black-bile formed by the spleen; while in the blood, which is prepared in the liver (an important error, not discarded until the 17th century), the elements are uniformly mixed. Mucus is cold and moist; yellow bile, warm and dry; black-bile, cold and dry; the blood, warm and moist.

This coincidence of the primary qualities is the cause of the secondary, so that the latter arise from the mixture of the former. The primary qualities are not cognizable by the senses, but only the secondary. The life-giving principle is the soul, understood as a primitive force, which as "spiritus", "pneuma", is taken from, and constantly renewed by, the general world-soul in the respiration, taken in its widest sense. Arrived in the body the pneuma becomes in the brain (to which it penetrates through the nose) and the nerves the "animal spirits" (*πνεῦμα ψυχικόν*, spiritus animalis); in the arteries and the heart (to which it comes by way of the lungs) the "vital spirits" (*πνεῦμα ζωτικόν*, spiritus vitalis); and in the liver and the renal veins, the "natural spirits" (*πνεῦμα φυσικόν*, spiritus naturalis). The three fundamental faculties (*δυνάμεις*, facultates), the "animal" (*ψυχική*), "vital" (*ζωτική*) and "natural" (*φυσική*), which bring into action and keep in operation the corresponding functions, originate as an expression of the primal force, "soul" (pneuma), existing in these three modalities within the body. Besides these, there are for special functions of the body other faculties, subordinate to these three and acting occasionally, as the "attractive" (*δ. ἑλκτική*), the "propulsive" (*δ. προωστική*), the "retentive" (*δ. καθεκτική*) and the "secreting" (*δ. ἀποκριτική*).

Upon these depend nutrition, assimilation, secretion, muscular contraction, in general all the ordinary functions of the body, in which each organ has the property of appropriating to itself by means of these faculties that which is necessary for its own existence. There are, besides these, "special forces", which are not derived from the three already named, and which are therefore supernatural. Everything, however, which exists and displays activity in the human body, originates in, and is formed upon, an intelligent plan, so that the organ in structure and function is the result of that plan. Thus the human frame is adapted to the solution of a teleological problem. Indeed Galen is the father of teleology in medicine.

"It was the Creator's infinite wisdom which selected the best means to attain his beneficent ends, and it is a proof of his omnipotence that he created every good thing according to his design, and thereby fulfilled his will", an expression which accords with the Christian ideas that were then forced by the spirit of the age upon the very heathen. (Schlosser.)

As in what precedes we find, besides views peculiar to Galen, a mixture of Hippocratic, Platonic, Aristotelian and Stoic ideas, so in what follows we observe a similar selection from the older views, besides those of purely Galenic origin.

Health is to be regarded as that condition in which all the functions of the body are performed without pain and without disturbance (effecting thereby the so-called euexia), the possibility of which depends upon the proper proportion of the solid and fluid constituents, and the correct mixture (crasis, eucrasis) of the humors. Consequently disease is that "unnatural" condition, in which a contrary state exists. Now diseases may affect:

1. The four elements and their corresponding cardinal fluids (general diseases), in the form of dyscrasiae, of which there may consequently be eight, while one or two are especially conspicuous.

2. The similar parts (general tissues: muscles, nerves, bones, ligaments etc.), in which either abnormal tension or relaxation (views of the Methodists!), or disturbance of the fundamental qualities (warmth, cold, moisture, dryness—Hippocratic!) through abnormal predominance of the one or the other, arises.

3. The organs (local diseases), in which the number, form, mass or position of the parts may be disturbed.

To the two latter classes of disease the abolition of the constant performance of the functions of the undisturbed condition is common.

Galen divides the causes of disease into the proximate and the remote, the latter of which again are subdivided into the external (occasional), and internal (predisposing) causes. The predisposing causes consist for the most part, in an overflow, or corruption, of the humors, for which latter condition Galen retained the "putrefaction" of the Pneumatists. This he considered a general cause of fever (the essential phenonenon of which was an elevation of the temperature—as it is to-day—more rarely moisture), with the exception of ephemeral fever, which arises from injury of the pneuma.—The influx of the blood into unusual places (error loci of Erasistratus!) is the cause of inflammation, with its cardinal symptoms, redness, heat, swelling and pain. Galen divides inflammation into the following curious classes, some of which are still current: a. erysipelatous, where the yellow bile mingles with the misplaced blood; b.—pneumatous, where the pneuma unites with the misplaced blood; c.—phlegmatous, where mucus mixes with the blood; d.—phlegmonous, when it depends purely on misplacement of the blood; e.—scirrhous, when black bile meets with the blood. The results of inflammation are resolution, exudation and suppuration.

Symptoms (epigenemata) are the visible results of disease. They are distributed (in opposition to the theoretical view of crudeness, coction and crisis, of Hippocrates) over the four stadia of disease recognized by Galen: the stadium initiale, incrementi, acmes and decrementi.

The course of disease becomes chronic through the influence of mucus and black bile, acute, through blood and yellow bile.

Galen, like Hippocrates, taught the doctrine of crises, but associated therewith the course of the sun and moon.

Galen is of peculiar importance in special pathology from the fact that he first, designedly, and extensively employed experiment for its basis. He was the first physiologist (if we except the accounts of the Hippocratists in embryology) to experiment and vivisect upon scientific principles. Thus he founded the physiology of the nervous system by section of the fifth cervical nerve, after which he saw the motility of the supra- and infra-spinatus muscles cease; similarly, after section of the recurrent nerve, (together with the intercostal muscles), and after destruction of the spinal marrow, he observed loss of the voice. Nerves of motion, which as such are "hard", are represented by the 60 spinal nerves; those of sensation ("soft") by the nerves of the brain. Of the latter he recognized seven: the optic; oculomotorius and trochlearis; 1st. branch of the trigeminus; 2d. and 3d. branches of the trigeminus; acoustic and facial; vagus, and glossopharyngeus. The nerves of the medulla oblongata were of mixed function.—Galen was acquainted with the movement of the brain, and assumed that by it the impurities of the "animal spirits", brought to the brain by the carotids, were expelled through the lamina cribrosa, while its more refined portions, the nervous spirits, were prepared in the plexus of the ventricles, and thence borne by the nerves throughout the body.—The great sensibility of the intestines depends upon the sympathetic nerve. The perception of light he locates in the retina.—According to Galen the secretion of milk depends upon pressure of the pregnant uterus upon the vessels of the abdomen, with which those of the breast anastomose.—Respiration and the pulse serve one purpose, the reception of air. The latter in inspiration comes first into the lungs, and thence into the left heart and arteries. On the other hand, during the diastole of the arteries air is sucked into them through the pores of the skin. During the systole of the lungs and arteries the "soot"[1] escapes. The air or pneuma received by the lungs is not sufficient by itself to cool the heart; hence air is also received through the skin. The diastole of the heart and arteries and inspiration also conduct pneuma to the blood, while the systole and expiration discharge the "soot" from the blood. Respiration has its origin in the vital, the pulse in the animal sphere. In this consists their essential difference, not in their function. Respiration is effected by means of the diaphragm and the intercostal muscles The physiological route of the pneuma (the respiratory process is one of combustion!) is developed within the body or the vessels as the circulation, which takes place as follows: from the stomach the food, which has undergone "coction", proceeds to the liver, where it is converted into blood. This blood is now carried to the heart, and the latter organ (whose various parts all contract simultaneously) drives into the lungs, through the pulmonary artery, so much of this blood as may be required for their nutrition. At the same time the remainder of the blood is driven through the veins into the body, and a minute portion passes through the pores of the septum into the left ventricle, where it is mixed with the pneuma drawn into the heart through the pulmonary veins in diastole. No blood returns from the lungs to the heart, for all of it is consumed in the nutrition of those organs. From the left heart the blood (mixed with the pneuma) proceeds through the aorta to be communicated to the veins finally by means of the pore-like anastomoses at the terminations of this vessel. To the veins all the nutrition of the body is due. The blood conveyed to the body by the veins is principally used up in nutrition; but what little remains, together with the new blood formed in the liver, returns to the right heart by a sort of ebb-tide in the venous circulation. Dilatation and diastole of the heart, as well as of the arteries, are the active factors in the motion of these parts, while systole is the passive element. The venous portion of the circulation is the seat, as we have seen, of nutrition; the arterial of the "vital spirits". Galen's explanation of the circulation is by no means clear. King Alfonso judged of the Ptolemaic system of the motion of the universe, that it was not sufficiently simple to be true. Singularly enough, however, no physician, down to the time of Harvey, formed a similar opinion of the theory of circulation of the Ancients! The blood is perfected in the heart and supplied with the calidum innatum, and then passes on into the body. The pulse arises from an active dilating force, pulse-force, communicated to the arteries from the heart. The heart has no nerves, but is the seat of passion and courage.[2] The brain is the seat of the rational soul, and an organ for the secretion of mucus and for cooling the heart. The lungs also serve to cool off the heart. The liver is the place for the preparation of the blood—and the seat of love! The "animal spirits" are the cause of the soul's activity. They originate from the blood, and are also originally "vital", but in the brain become the "animal" spirits. From the origin of the "animal spirits" the dependence of mental expressions and disturbances upon the bodily condition is also explained. Galen divides these mental disturbances into mania, melancholia, imbecility and dementia. In direct opposition to what has been said concerning mental activity and its cause and seat, he explains the temperaments by the mixture of the elements, and therefore divides them into 1.—the dry and warm (choleric); 2.—dry and cold (melancholic); 3.—moist and warm (sanguine); 4.—moist and cold (phlegmatic). The sensations again are dependent upon the animal spirits. The sight is effected through that portion of these spirits which is found between the lens and the choroid, and which intercepts the rays of light in order to conduct them to the optic nerve. The pneuma likewise occasions the smell by forcing its way into the anterior ventricles of the brain, which are the seat of this sense. The hearing originates in the penetration of the pneuma, in the form of waves, into the course of the nerve of hearing.—The natural spirits are the final cause of the natural functions, as well as of generation. In the latter, the man and the woman are equally concerned, since both have entirely similar organs, only the female organs, in accordance with the greater "coldness of the woman", are situated in the inner parts of the body. Both produce semen, the woman, a very fluid seed in the ovaries (whose excretory ducts are the Fallopian tubes), the man in the testicles, and the two are uniformly mixed during and after coition. In this process, according to Galen also, the right testicle supplies boys, the left, girls. In the development of the brain the "semen" alone is concerned, but in that of the intestines the blood, which the embryo sucks from the placenta, and in that of the vessels, both the blood and pneuma. The membranes originate in the colder female semen only; the heart is not completely formed at first etc. The stomach and intestines possess peristaltic movements, and from the former the dissolved mass of food only passes through the pylorus into the intestines.

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[1] Gr. λιγνὺς or τὸ καπνῶδες, Lat. fuligo: the excrementitious waste of the body. (H.)

[2] It is interesting to observe how this idea has engrafted itself upon our very language, courage coming down to us from the Latin cor, heart, through the mediæval Latin coraticum and the old French corage. So Chaucer says:

"So priketh hem Nature in hir corages".

The venereal function of the liver is at least as old as Plato, and descends certainly as late as Shakespeare. To Ford's question "Love my wife?" Pistol replies "With liver burning hot!" (H.)

Much more original is the knowledge of Galen in anatomy, which from his youth up he studied with enduring fondness. His observations were confined entirely to the lower animals, except in regard to the bones, which he had been able to study upon two human skeletons at Alexandria. One of these skeletons had been cleaned by birds, the other by the Nile, and Galen considered it a piece of special good-fortune that he had been able to study their structure. His anatomical works — the best among the Ancients — continued text-books down into the 16th century. He is in many points the first discoverer, and always a very careful describer, the latter especially in regard to osteology, the central and peripheral nervous system, the larynx, the intestines (he was acquainted with Wharton's duct) and the genital organs, though he too is not free from the confusion and errors of the Ancients, and readily falls into teleological speculations. He was the first to describe the structure of the tendo Achillis, the popliteus muscle, 8 muscles, of which two were situated upon the upper arm and two were masticatory muscles; the platysma myoides; the three coats of the arteries; very thoroughly also the eye (including the puncta lachrymalia and lachrymal ducts and glands. The tears, which up to this time had been looked upon as an exudation of the aqueous humor, he considered the secretion of the latter glands); the heart, which, by the way, he does not consider a muscle; the aorta, the jugular vein, the ductus Botalli, the foramen ovale, the muscles of the spine; six muscles of the eye and those of the larynx etc. He wrongly assigns to the heart a position in the center of the thoracic cavity, but knew that it was composed of straight, oblique and transverse fibres, and had a force of its own, which kept it beating after it was cut out of the body. He also holds that the veins arise from the liver and the arteries from the heart, but he does not (like Aristotle) derive the nerves from the latter organ, but from the brain. The spleen, in contrast to the liver, has arteries alone.

The services of Galen to descriptive, as well as to operative, surgery stand far behind those to pathology. Among the comparatively few observations made by him is found one of forward dislocation of the thigh. He mentions in an operative view trepanning, wounds (which, in opposition to Hippocrates and Celsus, he treats not with cold water, but with warm water and oil, a practice followed far into the Middle Ages, and even as late as the 18th century), diseases of bone etc., but devotes himself extensively to bleeding, the only operation which he regularly performed himself, while he abandoned the others to the "specialists". This "beneficent division of labor" was a real disadvantage to science, even at that time, for it prevented Galen, the trusty transmitter of ancient medicine, from saying much about the surgery of the Ancients, and induced him to confine himself in this department to salves, poultices etc. Yet he handled the subject of bandaging in detail, and introduced the methods known even to-day as the accipiter, the sling, the testudo, the spica etc.

In like manner he has written little on midwifery, though the birth of the child is, in his view, the result of the contraction of the muscular fibres of the uterus under active dilatation of the os uteri, aided by abdominal pressure. He says very little of gynæcology, and as little on diseases of the ears, and teeth, while he devotes more attention to diseases of the eyes. He is the first to mention keratonyxis or paracentesis corneæ, and he is acquainted with the removal of staphyloma and tattooing the cornea.

Galen did not greatly advance semeiology, with the exception of the doctrine of the pulse, which he elaborated so extensively that he wrote many treatises on this subject alone. He distinguished the following altogether too refined (and therefore, during life mostly entirely useless) classes, to which the sphygmography of to-day can probably still add a few varieties.

I. Absolute Differences of the Pulse.

A. Simple Relations.

1. In respect to the kind of progression of single pulse-waves = *pulsus celer, moderatus, tardus.*
2. In respect to the dimensions of the artery during diastole.
    a) In respect to the length of the pulse-wave = p. *longus, moderatus, brevis;*
    b) " " " breadth " " = p. *latus, moderatus, angustus;*
    c) " " " depth " " = p. *altus, moderatus, humilis;*
3. In respect to the strength of the pulse = p. *calidus, moderatus, imbecillus;*
4. In respect to the condition of the artery = p. *durus, moderatus, mollis;*
5. In respect to the intermission = p. *rarus, moderatus, creber.*

B. Combined Relations.

These arise from combinations of the varieties of pulse already named.

II. Relative Differences

of one pulsation from another = *pulsus rythmicus, arythmicus, æqualis, inæqualis, regularis, irregularis* etc." (Wunderlich.)

Galen advanced diagnosis chiefly by his sharper systematic definition of the phenomena of disease, while, so far as the means of investigation are concerned, he did not go beyond the Hippocratists and earlier physicians. His "hissing sound" in perforating wounds of the thorax is, however, worthy of mention.

In prognosis Galen prided himself upon surpassing the physicians of his day, and on equalling Hippocrates, whose principles he followed in this science. "I have read the Prognostics of Hippocrates as well as you. Why can I not prognosticate as well as you?" said one to him; he replied at once, "That by God's help he had *never* been deceived in his prognosis."

In special pathology Galen added little of importance to the material already existing, though he constructed his pictures of disease more perfectly through a better analysis of single symptoms; as e. g. in phthisis (its different forms and infectious (?) character), pneumonia, and pleuritis, gout, rheumatism, intermittent fever, varieties of spasm etc. Cancer he regards as a parasitic being, which occasions both local and general disturbances. In special therapeutics he seems, in opposition to his general therapeutic principles, to have given too much medicine, and particularly to have been too free with his favorite remedies, e. g. bleeding, cathartics and emetics, capers, pepper etc. He rightly, however, laid great weight on so-called climatic cures, of which he seems to have been the founder. But even in the treatment of disease, he was, as we should express it, less a practitioner, than a skilful, theorist.

The number of drugs used by Galen is very large. Moreover his inclination to, and use of, the numerous (animal and vegetable) compound remedies of "hoary theory" became extremely prejudicial to future ages, which could swear by nothing higher than Galen. Metallic remedies he rejected, regarding mercury as the greatest of poisons. Not infrequently open superstition played a rôle in his treatment. The effect of drugs, according to Galen, is based upon the harmony or disagreement of their "qualities" with the behavior in diseases of the "elementary qualities". These "qualities" were cognizable by the senses, and upon them depended the use of remedies. When the character of the disease was known, the remedy was chosen to correspond therewith. Hence drugs were divided theoretically into grades. If e. g. a drug is slightly heating, it is "warm in the first degree", if it is stronger, it is "warm in the second degree"; if still more heating, it is called "warm in the third degree"; if it disturbs the condition of the body, it is called "warm in the fourth degree". In toxicology he divides poisons into 1. refrigerants (narcotics), and 2. calorifacients, the latter subdivided again into corrosives and septics. (Marx.)

His general princples of treatment, in contrast to these incomprehensible speculations and his practical polypharmacy, are simple and natural. He lays great weight on correct diet: exercise, when practicable; reliance upon nature; care to benefit, or at least in bad cases to do no harm, and to cure without pain,—in all of which he follows Hipprocates. "Nature is the overseer by whom health is supplied to the sick. . . . Nature lends her aid on all sides, she decides and cures diseases. . . . . No one can be saved unless nature conquers the disease, and no one dies unless nature succumbs." He also strengthened the doctrine of "indications and contraindications", founded by the Methodists on false principles, by a natural consideration of the constitution and strength of the patient, the character, symptoms and course of the disease, the external conditions under which the invalid finds, or found himself, the cause of the disease, and finally also, in accordance with his own superstitious disposition and the tendencies of his age, by—dreams. He was at home too in professional policy. One should be neither too obsequious nor too gruff at the bedside; he should entertain the patient with serious or cheerful stories (as a suitable subject he suggests the proposition of Hipprocates that medical art is based upon disease, the patient and the physician — how pedantic!); he must yield to fashion e. g. in regard to the style of wearing the hair, but not as to pomatums! etc.

Galen was a man of universal education, versed especially in philosophy and rhetoric, and of an enormous technical knowledge, which enabled him to comprehend, historically and critically, the whole pre-existing science of medicine. This knowledge was the result of a marvellous capacity for labor, devoted, from a precocious youth onward to literary pursuits, in which respect he was equalled by scarcely any physician of any age. Thus he became one of the greatest medical savants, most eminent scholars and most fruitful authors of all time. If he was, on the whole, rather a great compiler and savant, he was yet an independent investigator also, particularly in the departments of anatomy and physiology, — he was the creator of experimental physiology — and by reason of his acuteness of mind and his great skill in dialectics he was a born systematist.

As an author — not infrequently he wrote down hastily out of complaisance to his hearers and friends, lectures just delivered — he was a master of language, and he took such delight in this gift that he often lapsed into prolixity and pompous diction. Thus his works lost in force and consequence what they gained in number and volume.

As a critic Galen was acute, but not always impartial.

As the result of his whole education and his natural disposition, he was better adapted for a teacher and savant than for a practitioner. In the latter capacity he seems never to have been very active, for his reported cases are very few ; at least they are much less numerous than with Hippocrates. Moreover he is self-complacent and desirous of fame (however much he may deny such charges), and in many things fanciful and, indeed, superstitious, in all of which he was unlike the unprejudiced Hippocrates!

Galen possessed a high conception of the profession of medicine, which may have tempted him into bitterness and harshness against the weakness and faults of the physicians of his day, though he, doubtless, in many things had the correct view, and spoke the truth, in this respect. Marcus Aurelius gave him such a character as Napoleon gave Larrey, that he was the only upright man whom he knew. Great physicians have in all ages been noble minds!

Taken all in all, Galen was rather a gifted savant than a pre-eminent practitioner like Hippocrates.

He lacked the practical glance of the latter, though not the gift of observation, which in Galen was directed to the so-called scientific branches. With him all science and thought was applied to the theoretical elucidation of medicine; with Hippocrates, only to its practical employment and utilization. Even where Galen is original, it is only in the theoretical departments of medicine! Even during his lifetime Galen enjoyed great reputation as a philosopher, and a medical teacher and law-giver. Through the whole Middle Ages this reputation continued undisputed, and by it he was the lord and master of medicine for fifteen hundred years! And yet Boerhaave summed up the result of his rule in the words: "Galen has done more harm than good" — a judgment which, however, seems too harsh.

MARCELLUS OF SIDA (about A. D. 138)

treated medical subjects in hexameter verse an offence against common-sense and taste which forestalled the Middle Ages. Of this poem in 42 books, fragments

"On remedies derived from the fish kingdom" and on lykanthropia have been preserved to us. The latter disease was an ancient psychical plague, in which the sufferers left their houses by night, howling like wolves and roaming about among the graves, wan, with sunken cheeks and hollow eyes, dry tongues and tormented by thirst. Ulcers upon the legs were the results of wounds received from thorns. The disease prevailed especially in February and March of each year. Marcellus himself is an evidence of the declining condition of medicine as early as his day.

MAGNUS OF EPHESUS (about A. D. 150)

was archiater at Rome in the time of Galen, explained the pulse as an alternate swelling and sinking of the veins, and placed the seat of hydrophobia in the stomach and diaphragm.

LEONIDES OF ALEXANDRIA (about A. D. 200), "the Episynthetic",

was one of the most important of the great surgeons of the imperial period. He amputated limbs and cancerous breasts with the knife, even cutting through the healthy tissues, but treated hæmorrhage with the actual cautery. In operating for empyema he resorted to incision, as well as to burning through the chest-wall with the redhot iron. In hydrocele he first cauterized and then made an incision; he practised scarification in anasarca, recommended puncture in hydrocephalus, and found the reduction of hernia not very difficult. He assumes, like the earlier physicians, laceration of the peritoneum as the cause of hernia, and in large herniæ this is accompanied with laceration of the coverings of the testicle. Fistula, especially fistula in ano, he operated upon with a blunt-pointed knife, which he called a syringotome. He mentions callous ulcers, warts and excrescences on the genital organs, which do not originate of themselves, though he did not recognize coitus or infection as their cause, and he considered the actual cautery necessary for their removal. He also mentions buboes, fissures of the anus, orchitis, gonorrhœa etc. He was the most important syphilographer of antiquity, though he did not select the designations in use to-day, nor did he recognize general syphilis, which, according to all accounts, first made its appearance at a later period.

ALEXANDER OF APHRODISIAS IN CARIA (about A. D. 200), "the Exegete",

so named from his interpretations of Aristotle, was a favorite of Septimius Severus and a patron of Galen. He wrote a treatise "On fever".

ANTYLLUS (3d century)

was one of the most distinguished surgeons of antiquity, and the first who, in addition to depression, described the extraction of small cataracts.[1] He also described the so-called Antyllic method of operation on aneurism (ligation of the vessel both above and below the sack, followed by opening of the sack itself in order to remove its contents without cutting out the sack. Albert.) He was the first to describe aneurism precisely, as well as the method of practising venesection, cupping, scarification, arteriotomy, subcutaneous section of the ligaments in stiff joints, and of the ligaments of the tongue in stammering. He practised incision of the inner layer of the prepuce without injury of the skin in phimosis. He also discussed the different forms of hydrocephalus acutus (the seat of which he located between the skin and pericranium, or between the latter and the bones, or finally between the bones and the membranes of the brain.) He also described tracheotomy. As a physician Antyllus considered in his treatment the influence of air of different temperatures; of various bathing waters containing sulphur, alum and soda; of herb-baths, bathing and swimming (especially in chronic diseases); of gymnastic exercises; of residence; of the position of the sick; even of songs and declamation; and besides dietetic prescriptions, he gave also directions for the preparation of plasters, ointments etc. He advised that when leeches had fixed themselves upon the skin, their tails should be cut off, so that they might suck the more blood.—The brothers

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[1] Perhaps this operation was also practised earlier by the eminent oculists of the days of the Empire, Theodotius (?) Severus and Latyrion (or Satyrion). The cataract extraction of the Ancients had nothing in common with the operation of the present day. It was performed with the smallest possible wound of the cornea, more like our operation for hypopyon. About the time of Antyllus the modification of removing the lens by suction was likewise introduced (Magnus). In cases of ectropium Antyllus recommended the removal of a triangular piece, extending through the whole thickness of the lower lid. Severus recognized the layers of the cornea, and located onychion (in contradistinction to hypopyon) between them. He also described the changes of the conjunctiva in the blenorrhœa, so prevalent in his day, and in trachoma. In the latter disease he recommended the operation of periscinthismus, a semicircular incision of the scalp down to the bone, extending from one temple to the other, but avoiding the

PHILAGRIUS and POSIDONIUS

lived about A. D. 360-375, and were sufficiently enlightened to protest earnestly against the employment of mystic words in the preparation of medicines, an abuse which prevailed even at this period. The former removed a stone by an incision made from above into the neck of the bladder, and described the operation for aneurism resulting from the unskilful performance of bleeding. He laid bare the artery, applied two ligatures above the sack, and then divided the artery between the two. Then he opened the sack by a longitudinal incision, removed the coagulated blood, and tied the lower end of the artery, as had been done with the upper. The artery was then also divided between the lower ligatures. The sack was left to suppurate. POSIDONIUS was a distinguished neuro-pathologist and psychiater, who wrote on "phrenitis"—the phenomena of which he referred to the anatomical seat of the disease. The anterior parts of the brain, as the seat of the imagination, when diseased, produce only distorted images, but leave the reason free, while in injuries of the middle ventricle of the brain reason is disturbed. In disease of the posterior ventricle recollection is destroyed, and with it the other faculties. He also well described mania, night-mare, hydrophobia, catalepsy etc. etc.

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muscles. He likewise recommended anthiology, i. e. double suture of one of the veins of the eye, division of the vein between the ligatures, and finally tying the vein after sufficient blood had escaped. The first of these two terrible and useless barbarities (both of which were practised long after this period) was designed to prevent diseases of the eye by the long continued suppuration of such a ghastly wound. In the same way the operation of hypospathismus, which consisted in making three incisions through the skin of the forehead, followed by moxas to the temples, was supposed to act. Diseases of the eye in general, and especially cataract, were supposed to be due to a materia peccans descending from the brain, to which such horrible methods of treatment were designed to give an outlet. In cataract a cataract-space between the lens, located in the middle of the eye, and the iris was assumed (Magnus.) Severus explains that staphyloma of the cornea arises from ulcers of the cornea, which may also result in prolapse of the iris. Staphyloma is treated by ligatures, doubled and crossed. Of Latyrion nothing is known but his name, and the fact that he and Severus probably lived in the 3d century, prior to Antyllus.

6. MYSTICISM AND MAGIC IN ANCIENT MEDICINE.

It is an innate characteristic of the human mind that, with all its efforts after rational knowledge, there still clings to it in all ages a certain amount of mysticism. This mysticism manifests itself chiefly (though by no means exclusively) among the uneducated; and yet its highest grades appear in people, as in individuals, whose minds are excited and their bodies enervated by over education and miseducation, among whom mysticism wins, frequently and for long periods, the supremacy over reason. This is the result of that fatal inclination to explain the sum of all physical phenomena and appearances (which from the inadequacy and imperfection of human reason must ever remain unfathomable in their nature and cause) by associating them with supernatural powers, whether we call these God, angels, demons, or by some other title. By a mystical influence upon these beings, or by prayer to such creations of the fancy or personified conceptions, it is sought to obtain aid of a supernatural kind for time or for eternity. This inclination has always led (as it leads to-day), on the one hand, to the founding of religious sects, from the lowest order to the highest, and, on the other, — and often in close connection with these religions — to the awakening of all kinds of delusions, with their terrible and most unhappy results to the life of nations as well as individuals.

Both of these phenomena, in the life of individuals, as in history, advance step by step beside each other. Childhood, the most robust maturity, as well as hoary and decaying age the first and the last especially — of nations as of individuals, are not free from such efforts to comprehend the mystical, and that which will ever remain a secret to us. The search after the secrets of creation leads to faith, faith almost always to superstition, and at last to absurdities of action, when the power of reason fails, or is set aside.

This side of intellectual life from the very beginning won a place in ancient medicine, as it holds one among us to-day.

Hence arose the theurgic treatment of the priests, which precedes all medicine proper, and is found among all people. Hence at a later period arose, by the aid of inquisitive reason, those half philosophical half medical systems, which subsequently, in the golden age of most people, developed into a genuine medical art. But beside this moved quietly but steadily that mystic medicine, which finally, in the periods of intellectual decay of the race, appropriated once more the mastery.

Among some people this original medicine, indeed, continued to exist, and developed only into systems and theories of magic, which then transferred their evil effects to other nations of higher qualifications and greater refinement, in the day of their decaying mental power. Among the systems just named belongs, above all, the system of emanations of Zoroaster, which is to be regarded as the original source of all those which followed. In the time of their national weakness, after the Babylonian captivity, the Jews incorporated a portion of this system into their religious views and their system of medicine, always theurgic in its character. After the entire loss of their independence, however, a complete sect was formed among them in Alexandria (to which even Christ is said by some to have belonged), the Essenes or Therapeutæ (B. C. 150), in which a mixture of Jewish, and Zoroastrian, with a lesser portion of Pythagorean, views formed the rule of life. They believed the worship most acceptable to God consisted in seclusion, constant contemplation, purity of morals (sought especially in abstinence from sexual love), holy silence and a separation from other men, manifested externally by their white clothing etc. By these means they thought they could come into close relation with "The Emanation of God", the "Word of God", the "Son of God", and with the angels, so that a portion of their power might overflow upon them. Thus they expected to receive power to perform miracles and to cure diseases. They offered no sacrifices, but labored with their own hands at all kinds of work, and lived extremely sober and retired lives. Their chief business, speculative contemplation and the interpretation of the sacred books, degenerated, however, by degrees, into a nonsensical study of words and letters. Hence originated the Cabala ("oral tradition"), which called itself a science, but was really a web of nonsense of the worst kind, clothed in mysticism. Acibah (died A. D. 120) was called its founder[1] and the author of the "Book of Creation" (Sepher Jezirah),[2] from which, with the much later book Zohar of Simeon Ben Jochai, our knowledge of this absurdity is derived.

According to the doctrine of the Cabala, ten angels emanated from the "Eternal God", as the "first world", of whom the first three were knowledge, understanding and wisdom. Besides this first world there were, however, three others, emanating in continually widening concentric circles from the "Eternal": a "created", an "improved" and a "completed". The models of each of these exist already in the "first world". As regards the treatment of the sick, it was substantially this, that the corresponding powers of the "higher world" were to be set into activity, and that this was brought about by those persons who, through the Cabala, had acquired knowledge of these powers. Such nonsense at a late period affected even the Greeks, whose important spirits (Democritus, Aristotle, the Stoics etc.), especially in the time of their political and intellectual decay, almost all believed in dreams. But among the Romans, who cherished numerous and dense superstitions, it was more readily lighted up. Thus the sorcerers and swindlers Simon and Apollonius of Tyana in Cappadocia (A. D. 2–98), and their companion, Iarchas, the gymnosophist, bloomed forth as rivals of the Christian miracle-workers (in the form of bishops etc.). The doctrines of Zoroaster and these impostors were united with Platonic, and partially Christian views into a system which is distinguished as "New Platonism"

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[1] One of the spiritual fathers of this work was Philo of Alexandria (born A. D. 25), a contemporary of the Jewish historian Flavius Josephus.

[2] According to other authorities, however, it dates from the 7th century.

(the Neo-Platonic or second Alexandrian school), the founder of which was Ammonius Saccas (about A. D. 175–250). Plotinus (205–270 A. D.) — by the way, a vegetarian on religious grounds — and his three pupils, Herennius, Aurelius and Porphyrius (A. D. 233–304), Jamblichus (about A. D. 300) and Proclus (A. D. 411–485) built up and extended this system to all branches of science, while a certain Andreas Chrysaris, a physician, first introduced the Neo-Platonic philosophy into medicine. The whole universe, both above and below, was filled with emanations of God, with demons of higher and lower degree, and through a special grade of immersion in God, called ecstasy, the government over these demons was acquired by witchcraft. The lower demons, the authors of disease, suffered themselves to be managed by offerings and exorcism, by all sorts of symbols and mystic words, like Adonai, Sabaoth, Abraham, Isaac and Jacob, by the stammering words of newborn children etc. "Such words, of no signification to the reason, are undoubtedly the most powerful, especially the sacred words of the East, which spring from the oldest tongue, and therefore that best-known and most agreeable to the gods." — There arose too various grades of the mystic treatment of the sick! Theosophy (Theocrasy) was founded on a union with the "Source of Light", and treated disease through God himself; theurgy worked by the aid of good demons; goety, by that of the evil; magic accomplished its ends by means of material demons and spirits of high degree; while pharmacy was a species of influence, through which the demons were subdued by means of drugs. To fill the measure of absurdity, with these follies were incorporated all the errors by which the pure germ of the doctrine of Christ had been transformed, errors from which even to-day we are not entirely free.

According to this patchwork system, which ruled the Middle Ages down to the time of Luther, the power of Christ, and consequently of God, was transferred by sprinkling or inunction to the priests (a favorite superstition from that day to this), and thus was presented a Christian system of emanations. Accordingly, even at this time, the priests possessed the power of curing diseases by the imposition of their hands, or by prayer and inunction (chrisma), as well as the power of raising the dead, though all these claims were not fully erected until the Middle Ages. In course of time the relics of martyrs were employed as the therapeutic agents, e. g. the bones of Cosmas and Damianus, both of whom, under the pretext of introducing medicine, devoted themselves to proselytism, and were accordingly executed as martyrs under the reign of Diocletian. Subsequently they were honored with a temple as medical saints. Exorcism too, by which Christ himself was evoked, was called in to drive out the evil spirit of disease.[1] Finally all these absurdities were heaped together by the later Gnostics under the lead of Basilides (in the reign of Hadrian),

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1. In the year 1884 appeared "Die Verwaltung des Exorcistats etc", by Dr. Chr. Bischofberger, a priest, 2d edition, Leutkirch, the venerable formulæ of which work spring from the age of the apostles!

who collected 365 "æons" with Christ at their head, and whose number was expressed by the mystic word Abraxas, which was endowed with mystical power. Now arose talismans inscribed with words and symbols like *IAΩ*, *ΦPH*, ✡ (the diagram of the Gnostics, now a sign for lager-beer). Another unfortunate delusion - alchemy, the mother of chemistry,[1] grew up in these dark ages out of the effort to make gold. Such was the object of the "philosopher's stone", and the art of finding this wonderful stone was taught in forged books of the so-called Hermes Trismegistus, e. g. in the "Tabula Smaragdina", and particularly in the book called Cyranides[2] (about A. D. 400), of Greek origin. Besides these follies astrology was also industriously cultivated.

This wonderful, disgusting and, indeed, dismal mixture of superstition, folly, delusion and every dark abortion of the human mind, borrowed from all "religions" and brewed up with the old Greek philosophy (which it also disgraced), is explicable only by considering it the last flicker of the ancient spirit, when, confused and fantastic, it confounded earth and heaven, men and spirits, impostors and demons, priests and gods, nonsense and reason, in the visions of death's delirium, and united them into a caricature of human thought and human feeling.

7. MEDICINE DURING THE LAST PERIOD OF THE ROMAN EMPIRE, BOTH BEFORE AND AFTER ITS DIVISION (A. D. 395), AND DOWN TO THE OVERTHROW OF THE WESTERN EMPIRE.

It is difficult to say whether it was chiefly its deep offences against the old religion and the mental acquisitions of the past, as we have been able to indicate them briefly in the preceding section, or the physical decay of the Romans, associated as it was with vice of every form, — and the vices of old age are worse than those of youth — or, finally, whether it was the moral and social corruption of slavery, which admitted no middle class, and through intermixtures of blood destroyed the ancient families, which introduced and occasioned the overthrow of the well-knit Roman Empire, and the downfall of the most powerful of nations. It is difficult to prove which of these phenomena was the cause, and which the effect of the other. To us it seems that the cause lay in the manifest corporeal decay of the nation, accelerated by intermixture with all sorts of degraded or entirely uncivilized people, as well as in the coarseness of physical life, as it manifested itself in the last ages of the Romans (and specially in Rome, the sink of all vice), from the highest dignitary down to the common people and the soldiers, and against which the better emperors and statesmen, as well as poets and philosophers, vainly strove with all their power. During and after physical decay there comes almost always and everywhere a mental decay, and only a degenerate and perishing people enslaves itself to mammon, to appetite,[1] to insane luxury, to the government of mistresses with its many consequences, to prostitution, and, after all these, to the most shameless debauchery practised by the Romans of later times.

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[1] Originating in Egypt, which is called Kemi by the Egyptians.

[2] Liber physico-medicus Kiranidum Kirani, i. e. Regis Persarum, vere aureus gemmeusque etc., a sort of mystic materia medica in which numerous vegetable and animal remedies are enumerated, with theosophic and absurd directions for their preparation etc. (H.)

Interest in science decayed more and more, and with it, of course, medicine also declined in these times of dissolution. No law against the prevalence of alchemy, magic and astrology (though one was promulgated by the enlightened Diocletian in the year A. D. 296) could avail,[2] when his predecessors upon the throne, Alexander Severus, Marcus Aurelius, Antoninus Pius, Vespasian, Hadrian etc. had cultivated this most absurd tendency of the age, and lent it their aid. Even Julian, the gifted and enthusiastic Apostate (A. D. 360-363), by his restoration of the schools at Athens and Alexandria and his solicitude for pagan science and its representatives, could not put a stop to that decay. As little too was accomplished by the improvement of the external position of physicians under Valentinian I. and Valens (A. D. 364-378). To an orthodoxy which hated everything pagan was added the passion for rapine und destruction of the Arian hosts of the Goths, who, under the lead of Alaric, for the first time extended their incursions into Greece. What benefit then could result from the foundation of a new university at Rome[3] in the beginning of the 5th century by Theodosius, who in 426 ordered the destruction of the heathen temples — so low had sunk the taste for ancient art? The mental weakness rooted in the loss of the cheerfulness of the Ancients lent its aid to the birth of all superstition, and there began in this period to develop a monstrous state of affairs — the whole world, after a period of atheism, sunk for long centuries, more than before, into the hands of a self-deceived or deceitful priesthood, or into the worst forms of Theurgy.

Thus even the pagan physicians of this period either drifted into magic medicine or, at best, were compilers of more or less originality, or rude empirics, none of whom accomplished anything permanent and new. Under the name of

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[1] Apicius, under Augustus and Tiberius, had guzzled down more than three and a half millions of dollars.

[2] This edict prohibited the practice of alchemy, and ordered all books on this subject in Egypt to be collected and burned. Magic was also subjected to a rigorous inquisition at Rome and Antioch under Valentinian and Valens (A. D. 374), in which many innocent persons were falsely accused of, and executed for, its practice. (H.)

[3] Theodosius II. about A. D. 425 established an Academy at Constantinople, with a corps of 31 professors. The "Athenæum" at Rome, founded by Hadrian (A. D. 117-138), enlarged and endowed by Severus (A. D. 222-235), subsequently declined, but was restored by Valentinian (A. D. 364-375), who published for its discipline the "Eleven Academic Laws". It was again reorganized by Athalaric (A. D. 526-532), after which period I am unable to trace it. I know of no educational institution founded by Theodosius at *Rome*. (H.)

Quintus Serenus Samonicus (died A. D. 211)

there is still extant a medical poem in hexameter verse.[1] Which of the two physicians of this name, the father (who was put to death under Caracalla, A. D. 211, probably for his recommendation of amulets, which the emperor, crack-brained as he was himself, had interdicted), or the son (teacher of the younger Gordian A. D. 237), is the author of this work is unknown. In it the most ludicrous and disgusting remedies are recommended, e. g. mouse-dung dissolved in rainwater as a poultice for swelling of the female breast; goat's urine internally for stone in the bladder; earth and dung from a wagon-rut for the pains of colic, used externally; as well as amulets with magic words arranged in curious forms, as [2]:

ABRACADABRA
BRACADABRA
RACADABRA
ACADABRA
CADABRA
ADABRA
DABRA
ABRA
BRA
RA
A

adoration of the numbers 3, 7 and 9 etc.[3] Besides these we find, however, a few reasonable counsels, e. g. animal baths[4] for gout, the recommendation of cheap drugs. A contemporary of Samonicus was

Gargilius Martialis (A. D. 220–240),

who wrote on the subject of plants and their use.

Of a different class from the physicians just named were the teachers and physicians supported and salaried by Julian at Alexandria:

Zeno of Cyprus (A. D. 330)

was one of the partisans of Gregory banished from Alexandria, and a famous teacher, who was recalled again with honor by Julian. Among his pupils were Oribasius and

Magnus of Alexandria, the Iatrosophist,

an acute, litigious professor of the art of healing, who wrote a lost work on uroscopy. For reasons easily comprehended he was not liked by the physicians of his time, since he always doubted whether a patient had ever been cured by them!

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[1] "De Medicina Præcepta". (H.)

[2] The "Abracadabra" was to be written on cloth or parchment and suspended from the neck in intermittent fever. (H.)

[3] Two of his highly poetical verses run:

"Si vero horrendum vulnus fera fecerit aspis,
Urinam credunt propriam conducere potu."

"Siquis hyoscyamum gustarit, lacte capellæ
Exhausto, rabidos poterit mulcere furores."

[4] "Seminecisve hirci reserato pectore calces
Insere: sic diræ reprimes primordia pestis." (H.)

IONICUS OF SARDIS in Lydia (A. D. 360)

was a famous physician and savant, the son of an equally famous physician, and an eminent anatomist, pharmacologist and surgeon, though he was no operator.

THEON OF ALEXANDRIA, the Archiater,

lived in Gaul at the close of the fourth century, and was the author of a work "On man", which was not lost until after the ninth century. It is a striking historical fact, that, while very many important medical works have been lost, the much-abused compilations prepared from them have been preserved. This may depend upon the circumstance that, even in ancient times, the extent of literature did not permit most physicians to find leisure for the study of the whole, and thus the demand for compilations was greater than for the original works themselves. The higher price of a collection of original works was also to be considered, so that the purse of most physicians might not suffice for their purchase. Perhaps too the scientific interest of most physicians then, like those of the present day, extended no further than the possession of the books necessary for their business, and thus these have been preserved to posterity because they existed in greater numbers. All these circumstances combined may have preserved the works of the following physician, while most of the authors who formed the sources of his compilation have perished.

ORIBASIUS OF PERGAMUS (or Sardis, A. D. 326–403) is very important as the transmitter of the lost views of the old medical authors in excellent compilations, like his "Medical Compendium",[1] "Synopsis for Eustathius", "Euporista" etc.

He was ordinary physician to Julian the Apostate, with whom he became acquainted in the year 355 at Athens. He accompanied him from Gaul after his nomination as the "Cæsar", and at his request made an epitome of Galen (now lost), and prepared the material for his other compilations. Educated for a physician under Zeno, at Alexandria, he possessed a very good general education, and was of noble descent. Besides this, being versatile, fond of intrigue and useful in all kinds of business, he, by virtue of these qualities, aided Julian to the throne, and was accordingly made by the emperor "Quæstor" of Constantinople. During the short period of Julian's reign he composed his still extant works. On Julian's Persian campaign he filled the office of ordinary physician in attendance. He was not able, however, to cure the wound of his friend and master, and the new authorities, in consequence of the position which he had held near Julian, deprived him of his property and banished him among the barbarians. Here he enjoyed very great esteem as a physician, but was speedily recalled with honor to Constantinople, where he lived to a great age.

Besides the excellent selection of authors upon which his work is based, several of whom are known solely from this work (he made use of Hippocrates, Galen especially, Dioscorides, Diocles, Erasistratus, Antyllus Soranus, Zopyrus, Mnaseas, Ctesias, Rufus, Archigenes, Herodotus, Philotimus, Marcellus, Lycus, Philumenus, Heliodorus, Philagrius, Dieuches, Mnesistheus etc.), he has also the merit of presenting his personal views and judgment, particularly in regard to dietetics and gymnastics. He was well acquainted with syphilis and gonorrhœa, and recommended urethral and vaginal injections in the treatment of the latter disease. He gives de-

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[1] Oribasius wrote in Greek. The Latin titles of his works are "Collecta medicinalia", "Synopsis ad Eustathium" and "Euporista ad Eunapium". Bussemaker and Daremberg edited an excellent edition of the works of Oribasius in Greek and French, 4 vols., Paris, 1851–62. (H.)

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tailed directions regarding venesection, which, in his opinion, should be practised as close as possible to the diseased point, and with an eye, not to the period of the disease, but simply to the condition of the patient etc. He also gives us a treatise on bandaging, with views on diseases of the liver, on the treatment of sterility etc.— From the age of Oribasius we have an

"Introduction to Anatomy", based upon the anatomical investigations of Aristotle, from whom it differs very little, save that it specially denies any pulsation in the veins. The membrana tympani and the peritoneum are well discussed, while, on the other hand, the Platonic view of the entrance of a portion of the drink into the air-passages is declared tenable —The converted Jew,

Adamantius of Alexandria, "the Iatrosophist", (about A. D. 350),

wrote on physiognomonics, in imitation of the similar work of Polemon, who lived under Hadrian. He likewise wrote on the treatment of the teeth, on pharmacology and the winds. Adamantius was a professor of medicine at Alexandria, for this is the signification of the title "Introsophist".

Sextus Placitus of Papyra (A. D. 370)

wrote on "Drugs derived from the animal kingdom"[1] in the style of an old woman. Thus e. g. he employs cooked puppy to relieve colic, and breaks up fever by cutting a splinter from a door, through which a eunuch has just passed, and saying: "I take thee that N. N. may be freed from fever!" Somewhat more intelligent is

Vindician (about A. D. 370), the friend of St. Augustine,[2]

and ordinary physician of the emperor Valentinian I. He has left to us a poem on the preparation of theriaca.[3] The bishop

Nemesius (about A. D. 400), of Emesa in Phœnicia,

in his book "On the nature of man",[4] devotes more attention to philosophy and psychology than to medical matters. A knowledge of the circulation of the blood has been ascribed to him; but his other physiological views differ too little from those of his age to permit us to find in his statements relative to this subject adequate data for a clear exposition of his ideas. Thus he maintains e. g. that the semen originates in the brain, is conducted to the testicles by the veins behind the ears, and is stored up in these organs. Sensation he located in the anterior ventricle, thought in the middle, and recollection in the posterior. Nemesius, however, strongly promoted the prevalent faith by his prohibition of the use of astrology.

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[1] "De medicamentis ex animalibus." (H.)

[2] Some legislative enactments, e. g. the Alemannic, were based upon the medical views of St. Augustine. He taught that the blood is inspissated during the first month of pregnancy; in the second the tendons and vessels originate; in the fourth the sex becomes determined; in the fifth the soul is formed and the child raises itself up; in the sixth the skin and medulla are developed; in the seventh, the intestines, and in the eighth, the nails and the heart. The doctrine of quickening in the second, and of sexual determination in the fourth month, were of importance in aggravating or lightening the penalty in cases of injury, abortion etc. of pregnant women. (Oesterlen.)

[3] The 78 hexameter lines referred to here scarcely constitute a poem, nor do they probably belong to Vindician. Meyer ascribes them to Marcellus Empiricus. Vindician, however, wrote a treatise entitled "De expertis", which has been utterly lost. (H.)

[4] *Περὶ φύσεως ἀνθρώπου*, De natura hominis. This treatise served in the schools as a physiological text-book for many ages. (H.)

Theodorus Priscianus[1] (called also Octavius Horatianus, about A. D. 380), ordinary physician of the emperor Gratian,

made a comparative catalogue of indigenous and foreign drugs, rejecting the latter in practice. He also recommended, besides magic remedies, many useful drugs, e. g. semen Santonici for worms etc. Werlhof classes his son Eusebius and his brother Timotheus among the Methodists. Priscianus was a pagan.

Under the name of

Pliny (Pseudo-Plinius, also Plinius Valerianus, probably lived in the beginning of the 4th century)

there is still extant a "Medicina Plinii",[2] a probably spurious collection of curious remedies, the authorship of which has been assigned to this period. We have also by

Lucius Apuleius (probably the beginning of the 5th century)

an Herbarium containing all sorts of inviting and uninviting popular remedies. This author, however, must not be confounded with the poet Lucius Apuleius Madaurensis (i. e. of Madaura in Africa), who was born under Hadrian and looked upon as a magician because he dissected animals. The *non plus ultra* of nonsense in the form of medicine was recommended, however, by the Christian,

Marcellus Empiricus[3] of Bordeaux, ordinary physician of Theodosius I. (345–395)

In case of a splinter in the eye, for instance, this should be touched three times, while the physician repeats as often the unmeaning words "Tetune resonco bregan gresso", expectorating each time. A stye may be removed from the eyelid by touching it nine times with the point of nine barley-corns, repeating each time "*φεῦγε, φεῦγε, κριθή σε διώκει*", or, if the abscess is situated on the right eye, by touching it with three fingers of the left hand, expectorating and saying thrice: "The mule brings into the world no young, nor does the stone produce wool; so may this disease come to no head, or, if it comes to a head, may it wither away." Marcellus further recommends as natural pills—rabbit's dung etc., and says certain remedies should be prepared e. g. on Thursday only, and when taking them the patient should—turn toward the east.—The two physicians last mentioned are historically important (as Daremberg has emphatically shown), because they transmitted to the Middle Ages a large part of the popular medicine of the Romans. (With us on the Rhine e. g., the "Hasenpillen" are used even to-day in consumption).

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[1] Priscian wrote in Greek, but translated his own writings into Latin. These consisted originally of six or seven books, of which we possess only five. (H.)

[2] According to Hæser there are no less than three works which pass under the title of Pseudo-Pliny: 1. A compilation of the 4th century extracted chiefly from the Historia naturalis of the elder Pliny, but containing also extracts from Gargilius Martialis, Vindician and Cælius Aurelianus; 2. A treatise of the 6th or 7th century, containing the three books of the original Pseudo-Pliny of the 4th century together with two others taken from other sources; and 3. a compilation of the 10th century, entitled "Liber de remediis", which contains also the three books of the Pseudo-Pliny of the 4th century, but is yet different from No. 2. (H.)

[3] "De medicamentis empiricis, physicis ac rationalibus liber." Marcellus was not a physician, and his work was probably written for the use of his son in visiting the sick, or in emergencies. Of course then Marcellus was not ordinary physician to Theodosius, but he was an Ex-magister officiorum under this emperor, an office supposed to be about equivalent to our Minister of the Interior. (H.)

After the division of the empire (A. D. 395) there lived in Constantinople a highly celebrated physician, **Hesychius of Damascus** in Cœle-Syria (about A. D. 430), the father of

Jacobus "Psychrestus",

who enjoyed still greater fame than his father, and came to Constantinople in the reign of Leo the Thracian (A. D. 457–474). From his erudition, his cures and particularly his success in prognosis, Psychrestus attained such estimation that he was styled "Savior" and "Æsculapius", and a statue in his honor was erected at Athens. On the whole he must have been a skilful charlatan, though he likewise defended some rational views; otherwise he would not have dared to rebuke the physicians of his day because in choosing their remedies they conformed too much to the luxury of their patients; nor would he have been satisfied with prescribing simple watery diet in chronic troubles, a treatment from which he derived his sobriquet of "Psychrestus".[1]

To this period belong also

Palladius of Alexandria, called the "Iatrosophist" (a title no longer uncommon), and

Asclepiodotus of the same city, who, like Palladius, whom he took for his model, wrote commentaries on Hippocrates in the Alexandrian fashion.

Cassius Felix (5th century) wrote a treatise on pathology *a capite ad calcem*, and

Severus, the "Iatrosophist",

likewise composed about this time his book "On Clysters", a remedy with which he was very fond of treating colic.

Medicine now fell rapidly into a new phase of development, the Græco-Arabic and Christian, and thus the old pagan medical science migrated to other peoples and passed over to a different principle of culture and to nations of another civilization, an epoch which begins historically the real Middle Ages of medicine. The slow process of decay in the Eastern Empire during the Middle Ages received only a feeble glimmer from the brilliant radiance of the ancient medicine — a glimmer which, like the nocturnal brightness of decaying wood, served but to render more visible the surrounding darkness. Arabian medicine (to say nothing of monastic medicine) in its meteoric rise and disappearance brought no true light into the twilight of the Middle Ages.

8. EPIDEMICS DURING THE CLOSING AGES OF ANTIQUITY.

To the causes already mentioned, which accelerated the downfall of the Roman Empire and speedily destroyed its western half, were added unsuccessful, and most unfortunate, wars, with their consequences, want of population, neglect of agriculture and continual military impressment, resulting in poverty and famine. Unusual misfortunes, independent

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3. From Greek ψυχρός, cold, a reference to his fondness for "cooling" remedies. (H.)

of human co-operation, were added in the devastation of earthquakes, floods and droughts, as well as the ravages of grasshoppers etc., calamities, which often extended over large districts of the empire. To misfortunes of this nature succeeded (each preceding evil always producing another new and worse) the blows of man and nature, delivered more and more rapidly and effectively against the ancient people and the mature and gradually withering stem of their civilization, culminating at last in terrible and destructive plagues. There were three especially fatal general plagues, which, however, singularly enough, are not described by physicians. The so-called plague of Orosius, that of Antoninus and that of Cyprian. Other lesser epidemics preceded, intervened between, or followed after, these more general visitations.

On the cessation of the eruption of Vesuvius, which began on the 23d of August, A. D. 78, and which buried Herculaneum, Stabiæ and Pompeii in ashes, there arose such a destructive plague, which for many days in succession slew 10,000 men daily.

The plague of Orosius (who described it most fully. He lived in the 5th century.) began in the year A. D. 125. "As immense masses of grasshoppers collected together throughout all Africa, and not only withdrew all hope of the harvest by devouring all vegetables, with a part of the roots, the leaves of the trees and the tender parts of the branches, but also gnawed through the bitter barks and even the dry wood, they were suddenly swept away by the wind, collected into swarms, driven through the air by day, and finally drowned in the African sea. As the tides threw immense heaps, through the force of the waves, upon the extended shore, the putrefying and corrupt mass exhaled an exceedingly disagreeable, and incredibly pernicious odor, from which proceeded so great a pestilence among all living creatures, that they, without distinction, perished from infection of the air; and then the putrefying bodies of birds and tame and wild beasts still increased the evils of the putrescence. How very great the plague was among men, I shudder, however, to relate; for in Numidia, where at that time Micipsa was king, 800,000 men perished, while in the region which lies most contiguous to the sea-shore of Carthage and Utica, more than 200,000 are said to have been cut down. In the city of Utica itself 30,000 soldiers, who had been ordered here for the defence of all Africa, were destroyed. This visitation occurred so suddenly and so heavily that at Utica, in a single day, more than 500 of these young men, it is related, were borne forth from one gate of the camp, dead." (Hæser.)

The plague of Antoninus (A. D. 164–180) visited the whole Roman Empire, from its most eastern, to its extreme western boundaries, beginning at the former, and spreading thence by means of the troops who returned from putting down a rebellion in Syria. In the year 166 it broke out for the first time in Rome, and returned again in the year 168. In its progress, which by degrees involved the whole Roman Empire, the plague depopulated entire cities and districts, so that forests sprung up in places before inhabited. It raged so fiercely, that in some places wagon-loads of corpses were borne at once to the grave, since individual burial was no longer possible. The loss of human life produced by this plague could not be even approximately estimated. In Rome many thousands died, especially soldiers and "nobles". In its last year it appears to have raged again with especial fury, so that in Rome (which was even then known to be very unhealthy in summer) 2000 men often died in a single day.—With regard to the character of this plague, it has been considered sometimes small-pox, sometimes petechial typhus, and again the bubo-plague.

The third so-called plague, that of Cyprian, raged about A. D. 251–266. Like the foregoing it displayed very marked contagiousness. The disease began with an indescribable feeling of heat, vomiting and redness of the eyes, to which were added sore-throat and colicky pains. These were followed by diarrhœa and gangrene of the limbs, of the organs of sense, and of the sexual organs. Genuine horrors or maniacal symptoms often manifested themselves in the sick.—The epidemic, in the regions visited by it with the greatest severity (for a long time 500 died a day in Rome), began mostly in the autumn, and continued with equal violence until August.—Before its final extinction it again attained a very great intensity, and after its disappearance Italy was almost deserted, while great swamps occupied the place of lands heretofore cultivated.—It has been assumed that this plague should be considered either a true bubo-plague, or small-pox.

In the year 312 appeared anew an epidemic disease, which was designated "Anthrax", but from its symptoms might be considered small-pox.

In England, after the famine year of 446, and in spite of the succeeding years of abundance, there appeared a "pest" so fatal, that the dead could scarcely be buried.—In Asia Minor especially there raged again in the year 455 a frightful pestilence, which was distinguished by swelling and redness of the skin, with severe cough, and death following generally on the third day. Possibly it may be explained by the assumption of scarlet fever, or pernicious measles. The loss of human life suffered by the Roman Empire towards its close by pestilence, famine, war, earthquakes etc., was so great that one of the Church fathers cried out: "The human race is extirpated, the earth is returning to uncultivated wastes!"

Though not so general and fatal as that form of the disease which prevailed among the Jews and in the Middle Ages, still the leprosy in its milder forms belongs among the plagues which visited the Greek and Roman people. Hippocrates knew its mild forms, and Aristotle also described elephantiasis (Satyria), as did Æschines and others. The disease came to Italy and the southwest of Europe in general in the latter half of the last century before Christ. A description, now lost, mentioned it as a disease, rare in Italy, but frequent in other regions. At a later period it appeared more frequently, and in the age of Galen it was known as a wide-spread disease (extending even into Germany). Serenus Samonicus and Marcellus Empiricus considered it a generally known disease, and in the fourth century after Christ horoscopes were taken, to determine whether a person would have the leprosy or not.

9. VETERINARY MEDICINE OF THE ROMAN PERIOD OF ANTIQUITY.

This art occupied relatively as high a position as human medicine. The occupation of even noble and educated Romans with "agriculture and cattle-breeding" was favorable to its development and improvement. Their ready perception of their own pecuniary interest led them, as they devoted attention to their slaves in their *valetudinaria*, so also to give special care to their sick cattle in their *veterinaria*. The medical treatment of cattle, like that of slaves, was considered a portion of the agricultural department, and was discussed in contemporary works on agriculture, e. g. by Celsus, whose treatise has been lost; by M. Porcius Cato[1], and by L. Junius Moderatus Columella (about A. D. 20), the famous agricultural writer, who studied well the diseases of horned cattle, and in epidemic diseases recommended the separation of the sick cattle from the sound, a measure of which, in the plagues of the human race, nothing seems to have been known at that period. Even before his time, probably, wrote the Greek Paxamos, who made use of the works of the Carthaginians Mago (middle of the 2nd or 3d century B. C.) and Hamilcar.—Eumelus of Thebes, in the third century after Christ, did good service as a special veterinary author, and among his contemporaries were Gargilius Martialis, Stratonicus, and Hieronymus of Lybia. A much more important writer, however, was Apsyrtus (in the first half of the fourth century after Christ), a veterinary physician descended from a veterinary family, under Constantine I. the Great (274–337). He described glanders and farcy, the strangles, founder, the distemper, as well as diarrhœa, grease, heaves, broken-wind, shoulder-strain, stag-evil, wind-gall, spavin, the toad, the scab, "kidney disease" and the staggers, and gives instruction in the castration of horses, the practice of bleeding, trepanning of the sternum, paracentesis, the treatment of fractures, the removal of worms etc. Even hints for determining the beauty and health of the horse were given, and the hereditary character of certain diseases, particularly defects of the eye, was taught. That horses have no gall-bladder was known to Apsyrtus. Contemporaries of Apsyrtus were the "Hippiatri" Hippocrates and Hemerius. To the same century belong too the superstitious Pelagonius, and Theomnestus, so devoted to odd remedies, and ordinary veterinarian of the first king of the Ostrogoths, Theodoric the Great (455–526), while the period of the Spaniard Pisterius, Litorius of Beneventum, Æmilius of Spain, Beretius, Hiero, Nepho, Agathothychus and others, some of whom are known by name only, is uncertain.

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[1] M. Terentius Varro (B. C. 117–26), the greatest of the Romans savants, indeed wrote on the subject of agriculture, but omitted all reference to medicine. Yet he mentions minute creatures, invisible to the eye, which penetrate through the mouth and nose into the body and occasion diseases of a severe character. Was this a presage of our modern bacteria?

The works of Apsyrtus were made use of by Hierocles, the lawyer (a sort of antique Bourgelat of the 4th or 5th century), and P. Vegetius Renatus of Volterra (about A. D. 380) borrowed likewise from other Greek authors his "Four Books on Veterinary Medicine",[1] in which the diseases of horned cattle especially are comprehensively treated.—To "small cattle", like sheep, hogs, dogs etc., little care was devoted in Antiquity.

That, besides practising veterinary physicians, there were also among the Romans army veterinarians, follows from the founding of a veterinarium for wounded and sick horses about A. D. 100. Even a kind of tariff for the "Mulomedici", as veterinary physicians were called, is found in an edict of Diocletian (284–313).

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[1] Mulomedicina seu ars veterinaria.

SECOND PERIOD.

THE MIDDLE AGES.

MEDICINE FROM THE DOWNFALL OF THE ROMAN EMPIRE TO THE DISCOVERY OF AMERICA.

A. D. 476–1492.

MEDIÆVAL MEDICINE.

THE MIDDLE AGES.

> "Man sieht wie in der trüben und dunkelen Zeit der Menschengeist ist immer geschäftig gewesen."
>
> Göthe, Ital. Reise.

The Middle Ages are frequently underrated and misunderstood, or at least misjudged, as regards their importance to the history of civilization, their necessity in the development of humanity. Filled with classic regrets, we would fain consider them the dark epoch of absolute barbarity or semi-barbarism; the period of history during which the glorious bloom of a by-gone civilization fell into the sere and yellow leaf and utterly withered away. This view, however, is but partially justifiable; for the Middle Ages — and from their latter half onward this fact is in every department plainly evident — served not to repress, nor even simply to maintain undisturbed, but actually to advance, the development of humanity and civilization, and thus promoted also the development of medicine.

When, indeed, we regard only the sublime greatness, the dazzling pomp and high lustre, of the golden age of the ancient peoples (especially the Greeks), but overlook their gradual senescence and infirm decay[1]; when too we contemplate the Middle Ages with a glance directed too exclusively toward the past, that first impression strikes us, undoubtedly, with a perfectly irresistible force; for then the fall appears almost instantaneous, and the damage almost irreparable[2]! This view, however, changes as soon as we turn our eyes away from the past and towards the rising future. To the dusk of the evening of Antiquity succeeded a night ever lightened by individual stars, until the dawn developed as a harbinger of the day of the modern era. Thus only does the importance of the Middle Ages to the future show itself, even in the field of medical culture.

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[1] Even at the very beginning of the Middle Ages, Athens and Rome, the centres of the ancient world, had declined into ruined and decaying provincial cities.

[2] Historical writing too is influenced, in not a few cases, by the very human peculiarity of representing the evil in the darkest, the good in the brightest, colors. Hence we frequently find ourselves in the dilemma of having before us either a pessimist or an enthusiast. It has thus become customary to represent the Middle Ages too darkly. Undoubtedly medicine especially found itself in bad hands during this period, and we meet on every side popes, bishops — even in the discussion of brothels! — priests, monks, nuns etc.; for every one who could merely cross himself dabbled to his heart's content in the medicine of the period. Hence it resulted that, besides the superstition descended from the olden time, a perfectly enormous mass of new superstition was crammed into, and (through the tradition of a future life) received by, the heads of the people, superstition to which they have clung so tenaciously, that very frequently, even to-day, we meet in ordinary practice mediæval ideas and medicaments, which it is difficult to set aside. We must always remember too that superstition has at all times clung tenaciously, and still clings, to mankind.

The trough of the descending wave of civilization did not reach very far into the Middle Ages. It had attained its greatest depth in the west of Europe as early as the 6th and 7th centuries. At this time only a few of the clergy could read and write, and the learned among them (in case they possessed the capacity) no longer occupied themselves, like the Church fathers and early clergy, with the great Ancients, for these were great — heathen, and they dreaded the commission of a deadly sin in consulting their works. Hence this was done only in the rarest of cases, and even then they were satisfied with the inferior authors, and particularly with the Romans. Accordingly they composed and read with so much the more zeal legends of the saints and similar superstitious fables full of religious fancies. Historical writing, above all, decayed almost entirely, and dry chronicles of the monasteries etc. took its place, though of course without making good its loss. Probably nothing demonstrates the complete enervation of all higher intellectual life in the Middle Ages so completely as this lack of historical writing. As early as the 8th century, however, a revival appeared, and from the countries and people of the south, about the time of Charlemagne, advanced the ascending wave of civilization in the West. To this the Arabians of Spain and the English gave the chief impulse. The dawn of civilization had begun!

Forwards, therefore, lies the peculiar importance, indeed the necessity, of the so-called Middle Ages to the advancement of humanity. The Ancients had so utterly exhausted their physical and mental activity; they had become so utterly powerless, that to their unmixed and unrefreshed existence nothing, save a general valetudinarianism and decay, was longer possible. And in this existence only a ray of the old spirit could stream forth fitfully here and there, like an ignis fatuus, in the general night of undisturbed stagnation, as the eastern Græco-Roman Empire — that mournful memorial of the frailty and transitoriness of the spiritual greatness of nations — actually showed.

Christianity, with its doctrine of the "renunciation and mortification" of the flesh, opposed itself to the cultivation of sensuality and the senses by the later Ancients. It was, indeed, an ethical reaction, but in its consequences it effected also the physical elevation of the race. Humanity was compelled to begin once more, as it were, from the beginning, in both the spiritual and corporeal directions.

A refreshing of body and spirit was required, and for this purpose even the slaughter and death of that which no longer possessed a capacity for life (provided it did not and would not die of itself), in order to make room for that which was fresh and vigorous. The irruption of a definite mass of robust, even violent, barbarity, of natural growth and based upon energy, healthy in character and apt for development; an irruption, I say, into the sickly, characterless and enervated, as well as vicious, over-refinement of the too highly cultured people of Antiquity, was indispensable to the execution of that decree of universal history — the maintenance of mankind in a condition suitable for further development. The law providing for the conservation of vigor in humanity prevailed with all its inexorable power, and to that law individual nations, yes, even entire races, from that day to this, have been ruthlessly sacrificed.

The creation of a new civilization in place of the decayed and stagnant culture of the Ancients was then the difficult task of the Middle Ages — a task which, at the expense, indeed, of the utmost travail, it completely accomplished.

The re-casting of humanity took place in two ways: in a physical point of view, through the migration of whole peoples, the violent commixture of a great part of the members of all the then known races of the earth; then through famine, terrible plagues, constant wars and endless strife. In a spiritual point of view it was the result of unprecedented struggles concerning the new feelings and thoughts awakened by a new and Christian philosophy and a new faith.

These surgings and struggles of the various barbarous and semi-barbarous peoples, Goths, Germans, Vandals, Huns, and later the Saracens, Sclaves (6th century), Hungarians (9th century) etc., during the Middle Ages, the particulars of which are but imperfectly known to us, introduced, with youthful blood and new seed, new strength of both will and action. Accordingly, as the result of this robust intermixture, the Ancients for the most part either perished, or, in favorable cases, united with the more youthful elements to form new nations. Yet in this crossing of blood with the over-civilized, in this contact with the over-refined forms of life, many of these semi-barbarous peoples also perished utterly, as among consumptives mixture with the diseased infects and destroys the healthy.

By this continual crossing arose vigorous mixed stocks, the Roman races, which still exist to-day and reach back in their origin to the earliest period of the Middle Ages. On the other hand e. g. the Goths, Vandals and Huns perished. It was another task of the Middle Ages to introduce and effect the association of different people and races in the support and advancement of civilization, a thing entirely foreign to Antiquity. For during Antiquity *one* people only relieved another; *one* civilized people only exercised a controlling influence at any *one* period. Hence the Middle Ages fulfilled a cosmopolitan mission. During Antiquity, even down to its very close, there was always one overshadowing empire; at the end of the Middle Ages, on the contrary, the powerful nations of the present day were already in existence. The Middle Ages inaugurated the empire of nationalities, and put a close to the period of universal empire.

In the prime of youth, with uncorrupted vigor, and full of independence, the German peoples (to whom belong so peculiarly the later Middle Ages and our modern times) seized upon the youthful career of humanity, to pass through an adolescence more protracted and more romantic than other races; an adolescence during which they were strengthened, at least spiritually, by their struggles, yet also squandered therein much of their national force, especially in the crusades and the struggles with the popes.

A new leaven of civilization was the doctrine of the carpenter's son of Nazareth, that man of the largest and warmest heart the world has ever seen, yet whose teachings were at once corrupted and falsified by the Roman mediæval priesthood (which of all professions has brought most evil upon mankind), instead of being freed from the dross of the time and the people of their founder. Yet through this corruption (so history teaches) the "Religion of love" has resulted in more dark delusion and horrors of all kinds than any other religious belief. It has been the bloodiest of all religions designed to bless mankind.

Man was perverted into God; faith, into superstition and delusion; benevolence and charity, into persecution of unbelievers; peace, into war, the natural, into the unnatural. At once it appeared how closely related were the faith, thus rank in its luxuriance, and unnatural phantasy, and how both in alliance lent aid to the senses and to sensuality, with all their evil consequences, never greater than during the "faithful" Middle Ages. Mournful, indeed, would be the reflection, that from the ethical seed sown by Christ proceeded such great evils, evils perhaps even the greatest that mankind has ever suffered, were it not true, on the other hand, that by the aid of a very small portion of that doctrine of loving mercy, happily conveyed into life, were accomplished those lofty deeds of charity, which certainly exercised upon the medicine of the Middle Ages an influence of especial importance: for through them the practice of that period received its peculiar character and impress.

If the medicine of Antiquity was *par excellence* the pupil of philosophy, theology, or perhaps it were better to say faith in general, stamped its seal on the medicine of the Middle Ages, so far as the latter did not (as with the Byzantines and Arabians) follow almost absolutely the Ancients. If too the medicine of the Ancients was pre-eminently a medicine of philosophic thought, and if modern medicine is a science of thoughtful observation, the medicine of the Middle Ages was the pupil of authority and faith, clinging slavishly, on the one hand, to the works and views of the Ancients and adopting particularly popular beliefs in order to Christianize them; on the other, striving after and instituting works of Christian charity (whose spirit and practice were ever more active in medicine than in theology), which had in view chiefly eternity, but concerning which ordinary medical knowledge and thought had for a long time manifested no interest whatsoever.

It is the fatal characteristic of the whole intellectual life of the Middle Ages that it remained without any productive philosophy, and above all, without any active skepticism. Even to scholastic philosophy, all direct, and almost all indirect, productive force was lacking. When, however, true philosophy once more came to be studied, above all when in the 16th century a vigorous skepticism began to act, the Middle Ages were injured at the root, so that the stem, blind faith and unreasoning repetition, was forced to wither away. (Ueberweg). Observation, which the Ancients cultivated occasionally and partially, was shut out for the same period.

The number of writers too, whom the Middle Ages chose for guides out of the great wealth of Antiquity, was trifling. The following are those whose works were chiefly utilized: Pliny (Hist. Nat.), Seneca (Quæstiones Nat.), Galen and a few books of Hippocrates; Ptolemy in astronomy and geography; Ælius Donatus in grammar; Vergil; the Arabic version of Aristotle; Dioscorides; Dion Cassius; Cælius Aurelianus; Celsus (rarely); Marcellus Empiricus (more frequently); Lucius Apuleius; Sextus Placitus Papyriensis and others. At a later period Paul of Ægina, Alexander of Tralles, Oribasius and a few others.

As regards medical science, and, indeed, the sciences in general, the Middle Age can at least display meritorious service in the preservation of the works of the Ancients. In this respect the Byzantine Greeks occupy the first rank; then the Arabians; and finally the monasteries merit consideration, though the latter, indeed, are of less importance than has been commonly taught. In the monasteries, as almost all productive and animating art was wanting, so too there was no productive investigation: indeed the latter seemed no longer necessary, since the sciences were believed to have been perfected by the Ancients. To collect from their knowledge, to appropriate what was thus collected, often without any critical research, was regarded in the Middle Ages, at least in the first half of this period, as science. Purely mechanical work filled the place of the art of the Ancients even down to their close. And it was the revival of genuine science and art, that is science and art in the sense of the Ancients, which renewed the spiritual leaven, that in the last centuries of the Middle Ages excited in medical affairs the mighty fermentation of mind, which finally called into life a medicine of observation. In practice too the Middle Ages introduced the institution of hospitals, so beneficent in many points of view.

Among the historical phenomena which compose, in the main, the medical Middle Ages, we must first consider Byzantine medicine, founded entirely upon Antiquity, or perhaps more truly a wretched continuation of that period; then the transplanting of Greek medicine among the Arabians, also the work of the Byzantine school; next the Christian labors in behalf of the care of the sick, including monastic medicine; and finally the vigorous impulse toward the founding of a new science of medicine in the last half of the Middle Ages.

IV. THE GREEK-CHRISTIAN MEDICINE OF THE EASTERN EMPIRE.

Grecian science, fortunately, ruled almost exclusively the medicine of the Eastern Empire, though in the long period which preceded its downfall it contributed to it nothing of importance.

This Empire itself, feeble from its foundation, sunk gradually during the Middle Ages so low, that for the greater portion of the thousand years of its existence during this period it lived solely by the grace of other nations. From time to time, however, it started up with apparent vigor, animated by the fortuitous and unwonted talents of the ruling emperor or his generals, or, perhaps, inspired by the energy of the reigning empress, but never impelled by a genuine outburst of national power. Its vitality in the sphere of intellect corresponded with its political existence, and forms one of the most wearisome and repulsive pictures of all history. It was an emasculated and mongrel life, which from heathen art and science had adopted little but their image and their forms, from Christianity, only its weaknesses.

Art (if we except architecture, which created some masterpieces), though still in many ways following the antique, had lost its necessary character of freedom, and was subordinated entirely to dogma and to faith. It degenerated into rigid and inflexible formalism, lost, like science, its creativeness, and exercised an evil influence upon the art of the West, which followed the lead of the Byzantine, even down to the time of Charlemagne. Besides architecture, mosaic and miniature painting were best cultivated. Sculpture and music received less attention, though instrumental music was admitted into the churches, while in the West vocal music only was allowed. Yet these relics at least preserved artistic effort, until in Italy a new art was able to develop in the 13th century.

The trade in court-offices, titles and matters of etiquette, the mania for imaginary positions of state, absurd factiousness, iconoclasm, the offspring of Christian fanaticism, the search after theological dogmas and other crotchets, sectarianism and all such nonsense, filled the heads of emperors, priests and savants at times when it was not absolutely necessary to defend themselves against the numerous enemies of their very life. And often, even when a struggle was going on before the very gates of the city for the existence of the empire, whose limits not infrequently extended no further than the walls of Byzantium, they fairly wearied themselves out in the most exasperating disputes over miserable subtilties of the Christian theology.

Yet this infirm Eastern Empire, involuntarily, indeed in spite of itself, performed services of inestimable value to humanity. Here the ancient Greek language, the mother-tongue of science, continued to survive, and here were collected and preserved a large part of its literary treasures. In jurisprudence the services of the Byzantine empire were especially valuable: in medicine they were less important, yet very considerable. Here originated some medical works of importance (even though they were mere compilations), and various other treatises, of secondary importance in medicine, yet precious for the insight which they give us into the spirit of the times.

Greek mental and moral culture continued to exercise its influence upon the West, even high up into northern latitudes. Vikings and Normans, in the ranks of the army, long supported the decaying empire. But, disregarding this and the commercial intercourse with the West, the visits of eastern physicians to Salerno and the kingdom of the Franks bear witness to this Byzantine influence, especially in the department of medicine.

Imperishable and inestimable, however, was the value to humanity of that empire, even in her death struggles; for from her borders came to the West those men[1] who, through the revival of the study of the ancient Greek authors, gave the impulse, which finally awakened mankind from the romantic twilight of mediæval faith to the dawn of a period of freshened and renewed thought. And here the spirit of the ancient Greeks in later hours celebrated a greater triumph than it could have ever won or celebrated in its own narrow home. It gleamed like an oriflamme on the standard of the spiritual liberators of mankind, and its works served as weapons with which these heroes won at last a free road to the light; for indirectly it was the creator of a new scientific epoch in general, and of the new medicine in particular. Here also approved itself again—and not for the last time—the fertile spiritual power of that peculiar old-Greek spirit-life, to which mankind owes the most, and above all the greatest, of its attainments! The writings to which it gave birth, by this influence of the past upon the future, laid the cable, by means of which the past, and the future of medicine came into a living and speaking union.

Below we mention certain Greek physicians of mediæval times, who belonged to the Eastern Empire, or were at least intellectually connected with it, though they were not all Christians. They no longer belonged to any special "school", but where Eclectics, and frequently collected into manuals (after the style of our modern physicians) the experiences of others, together with additions of their own, and hence were better or worse compilers or encyclopædists. Interesting and remarkable too is the fact that

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[1] The most famous of these were Barlaam (A. D. 1339), the friend of Petrarch; Leontius Pilatus, the first professor of the Greek language in the West, for whom, at the instance of Boccacio, a chair was created at Florence, A. D. 1360; Manuel Chrysoloras, who taught Greek literature at Florence, Pavia, Venice and Rome (A. D. 1396–1415); George of Trebizond (1430), Philelphus (1440), Theodorus Gaza (1450), George Gemistus Pletho (1440), Cardinal Bessarion (A. D. 1450), Pope Nicholas V. (1447–1455), Lascaris (1470). The first Greek book printed in Italy was a Greek grammar composed by Lascaris, and published at Milan in 1476. The press of Aldus Manutius was established at Venice about A. D. 1494. He printed more than 60 works of Greek literature, most of them for the first time. Guarini (1395), Aurispa (1423) and Philelphus (1440) also imported numerous Greek works into Italy. (H.)

Christianity, so-called, though so constantly fostered and nurtured in the Eastern Empire, remained almost without any apparent influence on the scientific substance of medicine. Medicine, as a science, remained Greek, beside a development of civilization in other respects entirely Christian and Pseudo-Christian. In therapeutics only did Christian influences show themselves prominently in the form of all kinds of new superstition.

The earliest of these eastern physicians (he lived in the first three quarters of the 6th century, about A. D. 502-575) was

AËTIUS of AMIDA (now Diarbekir) in Mesopotamia or Armenia, who pursued his studies at Alexandria, even then the first university of Antiquity. Thence he came to Byzantium, where he spent the greater portion of his life. He was a follower of the Christian superstition, and held the office of a comes obsequii (lord high chamberlain) at the betitled court of Byzantium. As such he was also ordinary physician of the "Great" Justinian I. (A. D. 527-565), who closed the pagan schools, and thereby inflicted upon his empire injuries similar to those inflicted upon France by Louis XIV. in his revocation of the Edict of Nantes. He had also this in common with the French king, that his former mistress, the actress Theodora, afterwards as his spouse exercised a great — and in truth a good — influence upon the government.

His 16 books on medical science[1] form a text-book of general medicine, and are based upon the teaching of many important ancient physicians, which without him would have been lost. They were subsequently divided into 4 "Tetrabilia", each of which comprises 4 "Sermones". The value of the compilation of Aëtius is naturally measured by that of the original writers (Archigenes, Philagrius, Leonides, Philumenus, Soranus, Aspasia etc.). Much, however, belongs to Aëtius himself, much to his time, the stamp of which is impressed especially upon his therapeutic counsels. For therapeutics generally furnish a relatively better barometer of the fallen condition of the science than the other branches of medicine,— a truth of which the whole Middle Ages furnishes numerous examples. In fact the bad for the most part long outlasts the beginning of improvement.

In surgical therapeutics Aëtius recommended a great number of salves and plasters, but also the seton, and even lithotomy in women. Moreover he mentions ligation and torsion as means for controlling hæmorrhage, and recommends irrigation with cold water in the treatment of wounds. The preparation of salves must, however, take place with certain superstitious ceremonies. Thus e. g. one should continually repeat, in a loud, but solemn, tone, the charm "The God of Abraham, the God of Isaac, the God of Jacob, give virtue to this medicament", until the consistency of plaster is obtained! If a bone is stuck in the throat the patient should swallow, and then draw out again, a piece of raw meat, to which a pack-thread has been fastened, — or the physician should grasp him by the throat (unfortunately the results of this treatment are not given!) and cry in a loud voice, "As Jesus Christ drew Lazarus from the grave, and Jonah out of the whale, thus Blasius, the martyr (A. D. 316) and servant of God, commands "Bone come up or go down!". In lithotomy he recommends the use of a knife guarded by a tube, to avoid wounding the internal organs of generation, which might result in impotence. He practises venesection on both the diseased and the sound side, and in cerebral congestion advises also to stick a straw into the nose of the patient, that the double hæmorrhage may render the cure more certain. — He further commends the pimpernel[1] in hydrophobia, pomegranate bark for worms, and, on the other hand, castration in leprosy. To detect poison in a wound he makes use of a poultice of walnuts laid upon it and afterwards thrown to a fowl: if the fowl eats the poultice, the wound is free from poison: if not, it is not! Moreover he defends the Hippocratic maxim that nature should be permitted to have her own way, a precept to which very different explanations have been given from Hippocrates' time down to our own day, since it is usually "the masters' own nature" which they ask others to follow. In hectic fevers he advises nutritious food; in febrile diseases generally, coolness of the apartment. "Lipyria", a febrile disease of the stomach accompanied with loss of speech and external chilliness, he cures by drinking cold water and the use of opium. Typhoid fever manifests as its chief symptoms stupor and delirium; febris algida, however, an icy coldness. The former depends upon inflammation of the liver, the latter, upon that of the lung. Erysipelatous inflammation of the intestines occasions especially hyperpyrexia (causus) and hectic fever. He speaks further of a superficial inflammation of the brain (erysipelas cerebri), of an inflammation of the brain in children (siriasis), of an itching of the bladder (scabies vesicæ), and of intestinal softening in children (chordapsus). He also, like Aretæus and Archigenes, mentions diphtheria, and evidently has an idea of the paralysis of the palate which follows the disease.

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[1] *Βιβλία ἰατρικὰ ἑκκαίδεκα* = Libri medicinales sedecim. The Greek text of the first eight books only has been published. A Latin translation of the whole work, however, was published by Cornarius and Montanus (Basil. 1533–35). (H.)

The condition of obstetrics at that time may be inferred from the fact that, in faulty positions of the child, he recommends the following procedure: to cut off the upper, and if necessary, the lower, extremities also; then to decapitate, and afterwards drag out with sharp hooks first the trunk and then the head — a style of management which prevailed down into the 18th century. Aëtius was, however, acquainted with podalic version, and also inculcated protection of the perineum. (It is remarkable that he nowhere mentions the great plague of his time.)

In the general night of ignorance Alexander of Tralles (525-605), in consequence of his relative independence, his excellent powers of observation and his skill in exposition, may be called comparatively a star of the first magnitude. Yet even he is not free from the dense mental obscurity of his century. His native city[2] was in Lydia, where first his father, Stephen, and subsequently his brother, Dioscurus, were physicians. Both came to Constantinople and occupied important positions. The same may be said of the other sons of Stephen, Metrodorus, the grammarian, Olympius, the jurist, and Anthemius (with Isidorus of Miletus and Ignatius), the architect of the church of St. Sophia.[3] Alexander's father at first, and his patron, the father of a certain Cosmas,[4] supplied his early education, and they were succeeded by the most famous teachers of medicine of that

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1. Anagallis Phœnicea. A decoction of this plant in beer is said to be the chief ingredient of "Stoy's medicine for hydrophobia." (H.)
2. Tralles was also the birthplace of other famous men, e. g. Apollonius and Tauriscus, the sculptors of the Farnese Bull.
3. He was also acquainted with the power of steam, and by its aid exemplified an earthquake for one of his neighbors.
4. Probably the Indian traveller, who thought the earth to be a flat surface surrounded by four walls, upon which rested the heavens.

day. On the completion of his studies he travelled extensively to Cyrene, Spain, Gaul, Italy and Greece, and finally settled down in Rome, where he died at an advanced age. Before his death, when no longer able to practice, he wrote his "Twelve Books on Medicine",[1] the fruit of a long life. In these, beginning (in the style of the day) with injuries of the head and terminating with the feet, he has left us a compendium of the pathology of his period.

His views give evidence of independent thought, in proof of which he binds himself to neither Hippocrates, nor the schools, nor yet to Galen (the idol of his own and later times), but, like a good eclectic and compiler, he makes use of them all. Yet he ventures (rank heresy in that day!) to reprove even Galen for his frequently incorrect methods of treatment.

His doctrine of fever, according to which the seat of fever is in the heart (he has no conception of an essential fever), is most complete. Fever results chiefly from diseases of the stomach and intestinal canal.— The general vitality suffers in diseases of special organs only so far as it functionates through these organs. Thus epilepsy depends upon disease of the brain, and he uses the seat of the aura as an indication of the point where a chronic suppuration should be maintained.— On mania and diseases of the mind in general he makes some admirable observations.— Inflammations of the throat he, like his predecessors, divides into cynanche (inflammation of the larynx), and para-cynanche (inflammation of the external parts of the larynx); then into synanche (inflammation of the pharynx), and para-synanche.— His methods of diagnosis are comparatively perfect. Thus he employs the pressure of the fingers for the detection of anasarca (the frequent inflammatory nature of which, indeed, he first recognized); palpation in enlargements of the spleen; inspection in the investigation of urinary sediments, which he discusses fully; percussion in tympanites and succussion in ascites.— The diseases occasioned by worms he describes very well, and he also recognizes lung-stones, so that he had evidently made dissections.— His views on the place where venesection should be practised give evidence of a freedom from prejudice far in advance of his time. He bled from all parts of the body, and held the opinion that it was perfectly immaterial whether the operation was performed in the vicinity of the diseased part (as Hippocrates preferred), or (as the Methodists directed) on the opposite side, since all the veins in the body communicate.— He admonishes his colleagues not to be dazzled by the glare of "The Authorities". Of drugs he is the first to mention rhubarb,[2] but he discards opium in many diseases (a remedy in his time used in all painful cases), since, as he correctly observes, it frequently occasions cerebral congestion. In gout he recommends blisters; in diarrhœa he warns against astringents, and instead of them, advises mild laxatives. In nervous fever he recommends the use of wine; in hectic fever, with circumscribed flushing of the cheeks, he especially advises milk-diet (goat's, asses', mare's milk). Always and above all, however, he lays stress upon consideration of the constitution, the mode of life, and the age and vigor of the patient, and he defines the task of the

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1. *Βιβλία ἰατρικὰ δυοκαίδεκα*, libri duodecim de re medica. The work is dedicated to his friend Cosmas, though the dedication is found at the beginning of the twelfth book. It was not completely translated into Latin until 1549. (H.)
2. Rhubarb is said to be mentioned in the herbal Pen-king, ascribed to the Chinese emperor Shen-nong, B. C. 2700. The *ῥᾶ* or *ῥῆον* of Dioscorides, the radix Pontica of Celsus and Scribonius Largus and the rhacoma of Pliny are supposed to be the rheum Rhaponticum, our garden rhubarb or pie-plant. (H.)

physician in the following words: "It is the duty of the physician to combat diseases with remedies which are opposed to their nature, to provide with circumspection everything necessary, and to rescue the patient with all art and caution, as one beleaguered in war". In striking contrast with these and similar sound principles, however, are his peculiarities and his superstition, in which qualities he was a true son of his time. Thus in gout he recommends a very complicated antidote, the use of which is to be begun in January, and continued for a year and a day. It is to be taken 100 days, then suspended for 30 days, then resumed for 100 days, then suspended 15 days, then it is prescribed again every second day for 260 days, after which 80 similar doses follow[1]! He cures the pains of colic by a stone, upon which is engraven the figure of Hercules strangling the serpent,[2] or by an iron ring, upon one side of which is exhibited an incantation, on the other, the diagram of the Gnostics. In gout he orders also the mystic words *μελ, θρευ, μορ, φορ, τευξ* etc. to be written upon a golden leaf during the wane of the moon! In intermittent fever he advises one to carry an olive leaf, upon which are written the mystic, because senseless, syllables ka, ra, a, or to drink menstrual blood (?), or to put on the dress of a lying-in woman! —Another medical treatise "Problemata",[3] which follows the humoral pathology with Methodistic and Pneumatic views, and goes under the name of Alexander of Aphrodisias, is probably from the pen of Alexander of Tralles. Thus e. g. the sparks seen after a blow upon the ear depend upon an inflammation of the spiritus visorius; hemeralopia, upon arrest of the advance of a too thick pneuma to the organ of sense &c.

Far less important are the following physicians of this period:

JOHN PHILOPONUS,

one of the earliest bishop-physicians, wrote commentaries on Galen, and lived in the sixth century.

JOHN OF ALEXANDRIA[4]

(about the end of the 6th, or beginning of the 7th, century) wrote commentaries on Hippocrates and Galen, which were translated into Arabic, and again from this tongue into Latin, as was afterwards often done with other works.

THEOPHILUS (Philotheus, Philaretus),

who lived under Heraclius (610–641), was distinguished by his investiture with the titular rank of "Protospatharius" that is Colonel of the Guard, a dignity with which the addresses of "Magnificence" and "Most Illustrious" were associated. He was one of the most popular physicians and medical authors during the Middle Ages, and his work "On the Structure of the Body" was often made the basis of instruction in the universities. In it, among other things, the olfactory nerves are first mentioned as a special pair of cerebral nerves; attention is directed to the dependence of the development of the skull and vertebral column upon that of the brain and spinal cord, and reference is made to how the wisdom and goodness of God have ordained everything so infinitely perfect, as to give e. g. to the hand precisely five fingers, and to the skull a spherical form! In general he follows Galen, as well in his treatise "On alvine dejections", as in those "On fever", "On the urine" and "On the pulse", part of which were composed in conjunction with the author next mentioned.

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[1] Probably this nonsense is hardly worthy of correction. In the interests of accuracy, however, it may be said that, according to the Latin translation of Günther von Andernach, the antidote was to be taken daily for 100 days, then suspended for 30 days; then resumed every day for 100 days and again suspended for 15 days. When 260 days had passed and 200 doses had been taken, it was to be administered every second day for 160 days, or until 80 doses had been taken. Then in the next 260 days 80 more doses were to be taken every third day (duobus diebus interpositis), until in all 365 doses should have been taken. It will be seen that the method of administration of this antidote was about as complex as its composition. (H.)

[2] A lion, not serpent. (H.)

[3] Not to be confounded with a work of similar title ascribed to Cassius the Iatrosophist and noticed on page 167. (H.)

[4] John Philoponus and John of Alexandria are often confounded, especially by the Arabians. The former is said to have been a Jacobite bishop in Alexandria in the 6th century. John of Alexandria is also known as John the Grammarian. (H.)

STEPHEN of ATHENS[1]
(who also appears as Stephen of Alexandria, a name shared by other and later writers) was a pupil of Theophilus, and is said to have been the author of works "On medicines", "Commentaries on the aphorisms of Hippocrates" and treatises on alchemy and astrology. By reason of the latter he was also distinguished as "The Philosopher", a title held in those times by all persons who busied themselves with such arts. In his treatise "On the Signs of Virginity" he mentions the Egyptian superstition, already noticed, that a reliable diagnostic sign of virginity may be found in the fact that peas upon which a virgin has urinated, germinate, while the contrary condition of sexual purity may be proven by the failure of the peas to sprout—apparently a very accommodating doctrine when we consider the germinative power of peas!

A man of entirely different spirit, standing alone among the Byzantine physicians as a great surgeon and obstetrician,[2] was PAUL of ÆGINA (about A. D. 625–690). He lived therefore under the emperors Heraclius (610–641), Constantius (642–668) and Constantine IV., Pogonatus (668-685). Paul had studied in Alexandria before this city had been captured by the caliph Omar (634–644) in December A. D. 641.[3] Concerning the rest of his life we know little more than that as an itinerant physician (periodeutes it was called at that period) and teacher (iatrosophist), without any permanent residence, he passed most of his life in Egypt and Asia Minor, and enjoyed great reputation even during his lifetime, so that his advice was sought from long distances. His work ("Seven Books, an epitome of the healing art";[1] the 6th book contains his surgery) enjoyed the greatest esteem among the Arabians, who translated it and metamorphosed it, with genuine oriental bombast, into "The Collection of the Pleiades", — a reference to the septenary of its divisions.

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[1] He flourished about A. D. 640. The treatise *περὶ οὐρῶν*, De urinis, commonly ascribed to Theophilus, is probably the work of his diciple Stephen, and is the earliest treatise on uroscopy which has been preserved to our day. (H.)

[2] Hence surnamed by the Arabians "Alkawabeli", i. e. the obstetrician.

[3] The noble library had been long before destroyed by Christian fanatics, like bishop Theophilus (under the reign of Theodosius I., who in 379 formally interdicted the pagan religion) and others. (Baas.) The credibility of the testimony of Abulfaragius as to the destruction of the Alexandrian library, on the capture of that city by Amrou, has been fiercely debated, but, on the whole, seems to be fairly well established. (See Milman's note on this subject in his edition of Gibbon's "Decline and Fall of the Roman Empire", chapter li). Dr. Baas himself seems to admit the fact on a preceding page (120). It will also be noticed that if the date assigned by the author for the birth of Paul is correct, he could have been but sixteen years old when Alexandria was captured — an age when his medical education at least could have been scarcely begun. Hæser says he flourished in the first half of the 7th century, probably under the reign of Heraclius, an opinion which accords with that of Meyer (Geschichte der Botanik). (H.)

Minor surgery. — Cupping with glass cups is considered inferior to the use of large metallic cups, because the former break easily, while the latter permit greater rarefaction of the air.

Scarification, arteriotomy, injection of the bladder ("mechanical" local treatment, or washing out a hollow organ) etc. belong to the procedures practised by Paul, and on the other hand venesection, and especially the actual cautery — in the use of which the Arabians, his pupils in surgery, even surpassed him — were recommended. Venesection was practised by him in the neighborhood of the diseased organ — in diseases of the eyes e. g. on the jugular or frontal vein — and its applicability was limited to the ages between 14 and 60 years, before and after which ages he did not, in general, approve of it. Paul employed the actual cautery freely in abscesses of the liver, empyema, old luxations etc., and allows it to act e. g. upon the head down to the bones, which he then scrapes in order to obtain cicatrization. In affections of the teeth, besides numerous dentifrices, he also employs the forceps.

In herniology he distinguishes between ordinary herniæ depending on mere stretching of the peritoneum, and scrotal hernia, which arises from a laceration of that membrane. The first form only is adapted to operative interference. He was acquainted with taxis by pressure while the abdomen is elevated. Varicocele he cures by the application of two ligatures, and the sloughing of the intermediate portion of the veins. Hydrocele he treats by incision. He recognizes also astringent poultices, the actual cautery and trusses (which he applied immediately after taxis), as remedies for hernia, the seat of which he locates in the sheath of the spermatic cord.

His syphilidology—if we can speak of such a science in a physician who did not know the specific character and contagiousness of syphilitic lesions—is tolerably complete. He recognizes phagedenic ulcers of the genitals in man and woman, non-inflammatory ulcers, moist, dry and excavated ulcers, and excrescences of the labia and foreskin, which he either excises or destroys with the hot iron. Gonorrhœa he describes in accordance with its symptoms, and distinguishes it from spermatorrhœa, but ascribes it to an ulceration of the urethra, the cause of which he does not recognize. On the other hand he considers the leprosy contagious.

In gynæcology he zealously employed the speculum vaginæ,[2] on the use of which depended his excellent knowledge of diseases of the uterus (atresia of the os uteri, fissures, excrescences, prolapsus etc.). In using the speculum the woman sat upon a high stool, and, grasping with her own hands the bend of the knees, raised the thighs, while a support was placed under the feet.[3] That the speculum might have

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1. *'Επιτομῆς ἰατρικῆς βιβλία ἑπτα*, compendii medici libri septem. Paul also wrote a work on midwifery, which has, however, been lost. The "Compendium" was translated into Arabic by Joannitius (Honain ebn Ishak) about 850. (H.)
2. These specula were either single- or many-bladed, and of various forms, (conical etc.).
3. This is not quite accurate, at least if I may trust the translation of Cornarius in the "Collectio Stephaniana". The woman was placed on her back upon a bench (supina in sella), the thighs drawn up against the abdomen and separated. The forearms were then passed through the popliteal spaces and tied by bandages to the neck. (H.)

the proper length, the vagina was first measured, and, after the introduction of the speculum, a dilating apparatus was employed. He recognizes the causes of hysteria and sterility, recommends clitoridectomy in nymphomania, ligation of the limbs in metrorrhagia, and limits the ordinary duration of menstruation to the years between 14 and 50, more rarely between 12 and 60. His remarks on obstetrics relate to the diseases of pregnancy, the alimentation of children, extraction of the dead child, embryotomy and delivery of the placenta. Very fat women were placed upon the abdomen with the legs raised up behind,[1] one of the most singular of the many parturient positions invented in the course of ages. Podalic version was already unknown to Paul.

The treatise on fractures and dislocations lays stress on the immediate application of splints and their infrequent change, even in complicated fractures of the leg. He recommends re-fracture in badly united fractures, even with the use of the chisel, and likewise thinks well of pressure and straightening of the callus. Fractures of the patella and femur are the rarest. Fractures of the skull require immediate trepanning: complete dislocations of the vertebræ are mortal, incomplete, produce scoliosis. He recognizes dislocations of the elbow and clavicle, admits the possibility only of luxation of the arm downwards, describes machines for straightening in cases of crooked growth etc.

Some of the remedies in his treatise on ophthalmology are odd enough; e. g. crocodile's dung in opacity of the cornea, bed-bugs' and frogs' blood in trichiasis etc. His advice in strabismus, to wear a special apparatus with suitable openings to correct the direction of vision, is judicious. He was the first to consider the contractibility of the iris in cataract a means of distinction between cataract and amaurosis, and says that pterygium often returns after operation. The cataract extraction which he mentions, like that of the Ancients in general, is a kind of operation for hypopyon. (Magnus.)

The military surgery of Paul is very complete, clear, and suited to the weapons of the period. It is evidently based upon a rich experience, for he had seen even the worst injuries do well, and in operations he desires, above all, that the wounded part should occupy the same position which it had occupied at the moment of injury. In order to remove sling-stones, darts, arrow-heads etc., he cuts or draws them out or pushes them through, and he gives judicious precautions to avoid the injury of any important parts. Thus he pushes a tube over the barbed heads of arrows etc. (Frölich.)

His treatise on operations mentions bandaging, scraping off polypi of the nose and ear; the removal of foreign bodies from these passages and from the œsophagus; paracentesis below the navel (on the right side in ascites from disease of the liver, on the left side of the abdomen where the ascites is due to disease of the spleen); tracheotomy, bronchotomy, tonsillotomy, staphylotomy and cauterization of the uvula; puncture in hydrocephalus, lithotomy; herniotomy with removal of the testicles, which continued to be the normal operation among the Arabians and mediæval surgeons until the time of Pierre Franco and still later. He also mentions double ligation, and even extirpation of the uterus, together with the removal of cancer of the breast; the operation for imperforate anus; adhesions of the pudenda and vagina; castration; amputation, dilatation of rectal strictures by bougies etc.[2]

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1. "Genibus ad femora inclinatis, quo uterus ad abdomen delatus, e directo osculi sit." (H.)
2. The instrumental apparatus of the ancient surgeons, both as regards the number of instruments and their form was very complete. Even a kind of antique instrument-case has been discovered. Among the various instruments we may

Pathology he treats from head to foot, after the method customary in his day. He also describes specially diseases of the skin and heart (without, however, differentiating the individual diseases), epidemic colic, and ascribes gout, very properly, to an inactive life, with too rich food &c.

His toxicology and pharmacology are based upon Dioscorides. Among special therapeutic measures he recommends opium in tetanus, venesection in apoplexy etc.

From the foregoing we may infer that Paul must have been one of the most capable, if not the most important, of the surgeons among the Greeks, and certainly the most daring operator among them. His appearance in this department of the healing art, and particularly at this time, seems the more surprising, since, for centuries before him, surgeons had made shift with an apparently inoffensive surgery of plasters and salves, rather than resort to operative measures.

Like ALEXANDER of TRALLES, he furnishes proof that genius, united with assiduity and experience, rise superior to the wretchedness of their age, and are able to shed light, even in the darkest periods of science, a light which depends, however, upon the individual alone, and is extinguished with him. The same fact is proven by the Greek physicians and medical writers to be named hereafter, but who in ability rank far beneath Paul.

The Christian priest-physician, "Presbyter" AHRUN (7th century), who lived at Alexandria and was a contemporary of Paul of Ægina, is especially important for having first carefully described the small-pox, its cause (heat and inflammation of the blood, with effervescence of yellow bile), symptoms, prognosis and treatment. His "Pandectæ", originally written in Greek, were translated into Syriac by Gosius, or, according to others, by Maserjawaih ebn Joljol, a Jew of Bassora.[1] In regard to prognosis he lays down the golden rule never to make it at the outset of the disease. Hypochondria and epilepsy he ascribes to their proper causes, and, with respect to the latter, prognosticates speedy death when the attacks occur daily. In like manner he rightly observes that petechiæ in epidemic diseases are of evil omen. He justly ascribes scrofula to bad food and habits of life, but gives incorrectly the prodromes of different forms of intermittent fever, and in surgery makes shift with external medication.

To the 8th century, probably, belongs the treatise "On the Nature of Man", which had for its author a Phrygian Monk, MELETIUS; to the first half of the 9th century, the "Synopsis of Medicine", by LEO, the IATROS-

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enumerate different kinds of knives, lancets, straight and curved needles, male and female catheters, sounds, sharp and smooth pincers for pushing and hooking, sharp and blunt hooks, forceps etc. etc. A forceps found in Pompeii is conjectured to be an obstetric forceps. Tubes with holes at the end and sides for vaginal injection (?), rods with flat plates at the end at an angle of 135 (laryngoscope?), trocars, spatulas, 2, 3 and 4 bladed specula vaginæ, spoons, cauteries etc. have also been found. The instruments were made of bronze, some of them gilded or silvered, or of iron etc.

[1] Ahrun lived under Heraclius (610–641). His "Pandectæ medicinæ", in thirty books, are known only by extracts found in Rhazes and Haly Abbas. They were translated into Syriac by Gosius, an Alexandrian (about 680), and thence into Arabic by Maserjawaih (Al Yehudi), a Jewish physician of Bassora in the reign of the caliph Merwan I. (683). (H.)

OPHIST; a little later, under Michael III. (842–867), the Constantinopolitan patriarch, **Photius**, equally at home in Greek and Latin literature, composed his "Bibliotheca", consisting of 279 books, and containing also some medical extracts.[1]

To the period of the Macedonian dynasty (867–1056), under which Byzantine literature was considerably promoted, especially by the literary compiler, savant and patron of learning, the emperor Constantine VII., Porphyrogenitus (911–951), belongs an "Epitome of general medicine" by **Theophanes Nonnus** (a work which begins with the creed and ends with the culinary art — Marx), as well as "Two anonymous books on **Hippiatrics**",[2] from which is derived our information of the veterinarians mentioned in the section on Ancient Medicine.

Michael Psellus (1020–1105) is of less importance for his medical works — "On the healing power of precious stones", "On the bath", a medical poem, a treatise on dietetics, a lexicon of the nomenclature of diseases, a treatise on the influence of demons, an encyclopædia embracing everything from heaven to the kitchen, in which works, however, Arabian remedies (e. g. rose-water) are first mentioned — than for his revival of the Platonic and Aristotelian philosophy. The latter, which, from its origin, contained within itself the germ of decay, degenerated in the West too into dialectic subtilties and definitions. By it was inaugurated the folly known as mediæval Scholasticism, which, as is well known, influenced medicine most injuriously. Michael Psellus himself, however, kept free from it. Animated by the greatest love of science, to which in his youth he was destined by his distinguished, but poor, parents, he pursued it with the greatest success, even so far as external position is concerned, for he became "Chief of the Philosophers". But his pupils corrupted his teachings and brought matters to such a pass, that he left Constantinople and ended his life in a cloister.

The above mentioned views of Psellus are of importance in consideration of the superstition as to the efficacy of precious stones in disease, which persisted clear through the Middle Ages down to modern times. He recommends e. g. the amethyst in *mania a potu* and in headache; the external use of amber in fever and in urinary disorders; the jasper in epilepsy; the beryl in jaundice, spasms and inflammation of the eyes; the magnet with milk internally in melancholy &c.

Simeon Sethi, who lived at court under Constantine IX. (1042–1054) and dedicated his chief work to Michael VII. (1071–1078), though he was compelled to withdraw from court before the Comnenus family ascended the throne (1057), is a man of importance in another view. The title-mad Byzantine emperors (like the German potentates of the 18th century) were

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1. Photius was patriarch of Constantinople (858–886). His work was entitled *Μυριόβιβλος*, and was a critical summary of the readings of the learned author, with occasional extracts from the originals. (H.)

2. *Τῶν Ἱππιατρικῶν βιβλία δυώ.* They were collected, by order of Constantine Porphyrogenitus about A. D. 940, from the writings of preceding authors. (H.)

fortunate enough to be able to stamp him "Master of the Wardrobe" and "Superintendent of the Palace of Antiochus". He affords us the first evidence that, by this time, Arabians (in reversal of the relation heretofore existing) exercised great influence on Greek medicine. For instance, he translated a "Dream-book" from Arabic into Greek, and in his chief work "On the Virtues of Aliments" mentions a great mass of Arabian remedies, such as

syrups, juleps, oils, camphor (which he considers "dry and cold in the third degree", recognizing also its anaphrodisiac virtue), musk, ambergris, balsam, nutmeg, cloves, hashish, the juice of lettuce, cinnamon (of which there were 7 kinds), asparagus (a kitchen herb in Rome 1000 years before) etc. Besides the above works he wrote a "Synopsis", and a treatise "On Taste, Smell and Feeling", evidence that he employed his muse assiduously in the monastery founded by him on mount Olympus, whither he had retired from the court.

NICETAS, who lived in the service of the emperors Constantine X. Ducas (1059–1067), Romanus IV. Diogenes (1067–1071), Michael VII. Ducas (1071–1078), and probably also Alexius I. Comnenus (1081–1118), compiled out of Hippocrates, Soranus, Galen, Rufus, Oribasius, Paul, and other writers his surgical work, "Books of Greek Surgery", adorned with gilded plates (at that time still a rarity) of bandages and machines, while

STEPHANUS MAGNETES,

probably at the beginning of the 12th century, furnished an "Alphabetic catalogue of remedies".

A certain SYNESIUS, under Manuel I. Comnenus (1143–1180),

translated from Arabic into Greek the "Viaticum" (Zad el Mosafer) of Abu Jafar Ahmed Ibn el-Jezzar, the Arabian Bædecker,[1] in which work the small-pox and measles are mentioned.

In the 12th century there also lived at Constantinople the distinguished physicians NICHOLAS CALLICLES, PANTECHNES MICHAEL, ordinary physician to the emperor Alexius I. Comnenus, and MICHAEL, a eunuch. Others of this class of mutilated physicians, are also mentioned at this period, e. g. THOMAS of LESBOS (under Manuel I. Comnenus), who acquired great wealth by the practice of venesection, but finally ended his life in prison.—The much landed but peevish blue-stocking, ANNA COMNENA (1083–1148), daughter of the emperor, also understood something of the medicine of her day, and even held the presidential chair at a council, in which, or rather by which, the pulmonary disease of her father (Alexius I.) was no better recognized or determined than it had been under her male predecessors.

The emperor MANUEL I. Comnenus[2] (1143–1180) was not entirely lacking in medical skill, for he performed venesection and applied bandages well, and even invented mixtures and ointments, which imperial compounds were, doubtless, especially efficacious—as long as the noble inventors lived.

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1. He was a native of Cairoan, and a pupil of Ishak Ibn Soleiman. El-Jezzar practised in his native city until his death A. D. 1004, and left a library of medical and other works valued at 24 talents. The Zad el Mosafer was translated into Latin under the title "Viaticum perigrinantis" by Constantine Africanus of the School of Salernum, about 1075. (H.)

2. The Comneni reigned in Constantinople 1057–1204, and from that time to 1461 in Trebizond.

In the year 1204 Baldwin, Count of Flanders, with his rude hosts took Constantinople, and founded the Latin Empire, the duration of which, however, extended only to 1261. He gave the decaying Eastern Empire a first and almost mortal blow, which was repeated with absolutely fatal effect in 1453. During this period, however, lived

Demetrius Pepagomenos, ordinary physician of Michael Palæologus (1261–1283), the first emperor of the family of Palæologus[1] (1261–1453), who wrote "On Gout" and, as a sporting author, "On the Rearing and Diseases of Falcons". He is also the first to mention senna.[2]

Nicholas Myrepsus,

who lived at Nicæa, and was "Actuarius" (i. e. physician-in-ordinary, a title which his contemporary Cabasilas first bore, instead of the earlier title "Comes Archiatrorum") under John Ducas Vataces (1222–1255), wrote a formulary in 48 sections, intermingled with Arabic remedies. It contains 2656 prescriptions against every disease which could befall a human being, e. g. lice, the itch &c. He mentions as remedies cooking-salt, quicksilver and sal ammoniac. Nicholas had studied at Salernum, an evidence both of the reputation of that school and of its connexion with the East.

The last to be mentioned, though by no means the least as regards worth, is **John Actuarius** (died 1283), son of Zachariah, and ordinary physician at the court of the Palæologi.

He wrote a good "Materia Medica", a treatise "On the Urine", in which many kinds of sediments are named in accordance with their colors, and graduated glasses for measuring the depth of these deposits are recommended; a physiological work "On the Animal Spirits", full of remarkable, though not always original, ideas, and a "Therapeutics", which contains no mention of surgery and the diseases of women, but otherwise exhibits a good abstract of Galenico-Arabic medicine. He ranks as a genius worthy of a better age.

With Actuarius, therefore, Græco-Christian medicine bids adieu to history more honorably than was to be expected from the past and future political, physical, moral and intellectual wretchedness of the Eastern Empire!

THE CONDITION OF MEDICAL INSTRUCTION AND PRACTICE IN THE EASTERN EMPIRE.

This, like the political condition, deteriorated, when compared with that which had prevailed in the undivided empire.

In this statement, however, (if we regard the question from the "modern" standpoint) we must not include the life and actions of the eastern students, who, at the school of Athens, enlisted scholars for their own favorite teachers from among the newly arrived students, and drummed up recruits for their societies. Through the influence of these societies, even at this early period, the students fell into frequenting drinking houses, and ran into debt. Like their ancient Roman predecessors, however, they were not compelled, under any circumstances, to submit to disgrace.[1]

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[1] The last member of this family died in distress in Italy, and his wife died of starvation in Rome in 1878. Sic transit splendor et gloria mundi!

[2] Senna is mentioned, however, by the elder Serapion and Ishak Ibn Soleiman (Isaac Judæus), both of whom flourished about A. D. 900. (H.)

The better physicians of the Eastern Empire were, as a rule, educated in Alexandria, though at a later period, during their travels as students, they also attended the Asiatic schools. Many simply received private instruction from certain famous physicians, and at most went to Alexandria to finish their education.

It is more than probable that, from the very origin of the Eastern Empire, the lower and uneducated elements of the medical profession predominated, and finally formed the majority. The individual exceptions which we have already considered, and which occurred then, as they do under any and all circumstances, prove nothing to the contrary, nor do they contradict the general low condition of the profession. These few exceptions, here, as in all other cases, merely prove the rule.

In accordance with the Byzantine customs numerous titles and "distinctions" of all sorts were given to the court physicians and physicians-in-ordinary, who, though not always the best physicians, yet, as they have "destiny" often on their side, at all times more easily attain prominence in history, while it is ever the lot of the ordinary practitioner to wear out his life in honorable, but unhonored, labor, and to die unnoticed. To these court physicians (besides the worthless and even venal titles of the old empire) were assigned new and strange titles, which frequently had no relation to the medical profession, and were, therefore, simply ridiculous. Among these titles were "Superintendent of the Palace", "Master of the Robes", "Savior" etc. Some of these higher physicians too were even employed in diplomatic missions, e. g. Stephen of Edessa, who was a sort of oriental Struensee or Baron Stockmar, and was sent to Chosroës because he had been at an earlier period an active teacher in Persia, and had won reputation by his success in medicine.[2] At a later period the physicians-in-ordinary received the title of "Actuarius". This office was even filled by eunuchs, an evidence that general luxury and boundless corruption had degraded even the medical profession. The same fact is established by the statement that physicians were expected to castrate boys and men — an expectation too which, as Paul of Ægina[3] half admits, was actually fulfilled. Yet, as the result of rude methods of operation or bad after treatment, 96 per cent. of the castrated died! In fact this abuse became so glaring that it became necessary to put a stop to it by law, and castration was punished by castration and banishment to a desert island.

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[1] We read that the ancient students formed cliques and societies, tossed objectionable tutors in blankets, cultivated wine and women and forgot to pay their bills etc., tout comme chez nous. (H.)

[2] Some years latter Chosroës concluded a treaty of peace for five years with Justinian, one of the conditions of which was that Tribunus, a physician of Palestine, should be sent to the Persian monarch. A charlatan Uranus also accompanied the embassy from Edessa, and imposed upon the confidence of Chosroës, by whom he was held in high esteem. (H.)

[3] Paul says "Verum quandoquidem sæpe etiam inviti aliquibus præeminentibus ad castrationem faciendam cogimur etc. (H.)

The number of regular physicians too in the Eastern Empire must have gradually diminished, as it did in the West, since the clergy speedily usurped the chief share of practice. This conclusion is supported too by the fact that the number of lay medical authors is so small in itself, and decreases in the same proportion as the empire enters upon the later Middle Ages and verges toward its close.

A noble acquisition to the cause of military hygiene in the Eastern Empire was due to the emperor Maurice (582–602), who was himself an author on military subjects and military hygiene. This prince ordered that, from every division of 200–400 cavalry, 8–10 stout fellows of the same command should be selected, whose duty it should be to bring to the rear those who were severely wounded, to refresh them with water from their canteens (phlaskion), and to collect together the weapons lying about and encumbering the field. Such mounted bearers of the sick and wounded (deputati) received as a reward for each person rescued about $2.40.

This arrangement was confirmed by Leo VI., the Philosopher (886–911). — What was the rule with regard to the infantry, and whether similar arrangements generally existed for these, is entirely unknown.

Of military physicians proper we have no express information, though in the code of Justinian such physicians were, indeed, mentioned, whose duty it was to examine soldiers as to their incapacity after diseases. Still these may have been civil physicians, employed for the occasion only. It is probable however that, at least in the beginning, the old Roman arrangements continued in force, until medicine was entirely transferred into the hands of the monks and the Christian attendants upon the sick, who were not permitted to practice surgery. The example of Paul of Ægina, who, at all events, possessed sufficient military experience to write on military surgery, speaks in favor of this hypothesis. The wounded might readily be cared for by the monks in the numerous hospitals of the Eastern Empire subject to their control, and which too, from the little extent of the empire, could be easily reached. Certainly at a very early date hospitals where introduced into Byzantine medical practice,[1] in which only monks, nuns and similar ignorant people, nursed the sick, in order to merit a place in heaven. That this was confessedly their chief object, and that their remedies belonged mainly among the Christian superstitions, does not prove, however, (as has been assumed by most writers) that the results of their treatment must have been particularly bad; for Nature, the friend of doctors and scorner of apothecaries, may have come promptly to the aid of simplicity and superstition, as she is compelled to do, even at the present day, with the numerous drugs of doubtful efficacy, prescribed in accordance with all the rules of art. Holy-oil, prayer, laying-on of hands, application of the bones of so-called saints, preserved as relics &c., and the harmless remedies of the monastic gardens—savine excepted, which seems to have been cultivated rather for cases of mishap on the part of celibates and nuns of reputed chastity—at least permitted nature to work undisturbed, and were, at all events, not less ineffective than the mouse-dung &c. of Serenus Samonicus. Indeed, from a therapeutic standpoint, they are not worthy of such severe condemnation as many curative methods and polypharmic compounds of the actual physicians and medical amateurs of that (and the present) day. On the whole, the monks seem to have done more injury to the minds and morals of mankind, than to their bodies, and to have harmed science and art more through the promotion of delusions and mental indolence, than they shortened the lives of their fellow-men by their "practice".

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[1] The first hospitals were probably instituted soon after the decree of Constantine which directed the closure of the Asclepieia and other pagan temples about A. D. 335. Helena, the mother of Constantine, was very active in founding such institutions at Constantinople, Jerusalem and other cities A hospital was also founded at Antioch during, or shortly after, the reign of the emperor Julian (361–363). The famous "Basilides" hospital was established at Cæsarea as early as A. D. 373. (H.)

The class of medical men who occupied themselves with the preparation of drugs was also, in the Byzantine empire, very extensive, in both the cities and the country. Among them were already some, who, as genuine apothecaries, devoted their time to the prescriptions of physicians. These were called pementarioi (pigmentarii), and held in such light esteem, that the law absolutely denied to them even civil offices. Their formulæ were manifold: besides the numerous drinks (the later official decocta and infusa), they also prepared pills, troches, electuaries, collyria etc. They existed up to the very end of the Byzantine empire, practised medicine themselves, and had as competitors a great number of peddling dealers, Jews and adventurers. This latter class of dealers in drugs seems, even at that time, to have found its chief customers among the lower class, as was the case also with us, in respect to similar individuals, until a few decennia ago. The regular physicians at that period, as it seems, commonly prepared their own drugs. At least they often wearied themselves out in the search for proprietary remedies, a practice in which they were imitated by even imperial pretenders — proof enough how little these latter had to rule, or how badly they ruled what they had! Thus the eastern emperors were, so to speak, the only apothecaries of imperial rank which have ever existed. Some of them also dabbled in practical medicine; indeed, even their daughters did the same. What must have been the general condition of medicine in that day may be judged from the fact that frequently the entire and extensive reputation of a Byzantine physician depended singly and solely upon some nostrum invented by him.

Veterinary physicians existed, at all events, in the Byzantine empire. The veterinary compendiums made at the instance of the emperors prove this. Their social position seems to have been analogous to that which they occupy at the present day.

V. GRÆCO-ARABIAN MEDICINE.

Europe, in the East as well as the West, finally preserved little but the ignis fatuus of the deceptive Græco-Roman civilization, popular superstition in its thousand varied forms. Wherever even a respectable remnant of intellectual enlightenment remained at the disposal of the perishing race, this depended upon the imitation and servile explanation of the views of the great physicians of an earlier age, and especially those of Galen. Darkness and superstition, from which arose the ancient medical culture, likewise accompanied it to its grave.

How powerful were the effects of even the sad relics of a civilization so lofty as that which the Greeks had attained, is manifest, however, in the fact that from the slow decay in the East a single germ of sound, though feeble, vitality, could transfer itself to an Asiatic people, and excite them (as if by magic) to a bloom and a fruitfulness, without its aid quite unattainable. This was what happened to the Arabians in philosophy and mathematics, and in a less degree as regards the natural sciences, but specially and chiefly in the medical sciences. Thus they were enabled to offer a new field for the civilization of mankind. Yet it was not the Arabians alone who created a new life out of the Ancients. Almost all the Orientals, Persians, Syrians, Christians and Jews under Arabic names, took part, indeed, in this new phase of the development of civilization: so that it is not strictly correct to speak of Arabian science and medicine alone.

We are, however, justified in speaking of a mediæval Semitic medical culture, as one of the most interesting episodes in the history of civilization. For at this time, long after the first great Semitic leadership in culture, a Semitic people again, and apparently for the last time, entered as a controlling factor into the history of the world and of civilization. It probably sounds paradoxical (though it is not) to affirm that, throughout the first half of the Middle Ages, science made its home chiefly with the Semites and Græco-Romans (its founders), while, in opposition to the original relations, faith and its outgrowths alone were fostered by the Germans. In the sterile wastes of the desert the Arabians constructed a verdant oasis of science, in lands to-day the home once more of absolute or partial barbarism. A genuine meteor of civilization were these Arabians, a meteor which arose from the long darkened Orient, and in its course toward the West lightened once more the whole Occident before its final extinction.

The Arabian physicians were almost all, and certainly the most important of them, doctors of all the faculties, as we would call them. The individual studies were not yet separated from each other so strictly as with us, and in practice, therefore, the savant could become as well a jurist as a theologian and physician, according to the occasion. Medicine, as well as philosophy, theology, mathematics, the natural sciences and jurisprudence, belonged to general education — a peculiarity of Arabian civilization, observed elsewhere only in the earliest grades of culture. This gives to Arabian medicine its stamp. It was based only upon science in its widest sense, and in the division of individual force which arose from the idea just mentioned, medicine could not be productive, or could be fertile in special directions only, and was compelled too to assume chiefly the character of compilation.

Accordingly the Arabians built their medicine upon the principles and theories of the Greeks (whose medical writings were studied and copied mostly in translations only), and especially upon those of Galen, in such a way, that, on the whole, they added to it very little matter of their own, save numerous subtle definitions and amplifications. But Indian medical views and works, as well as those of other earlier Asiatic peoples (e. g. the Chaldeans), exercised demonstrably, but in a subordinate degree, an influence upon Arabian medicine. The Arabians interwove too into their medical views various philosophical theorems, especially those of Aristotle, already corrupted by the Alexandrians and still further falsified by themselves with portions of the Neo-Platonic philosophy; and finally they added thereto a goodly share of the absurdities of astrology and alchemy. Indeed it is nowadays considered proven that they even made use of ancient Egyptian medical works, e. g. the papyrus Ebers.

Thus the medicine of the Arabians, like Grecian medicine its parent, did not greatly surpass the grade of development of mere medical philosophy, and. so far as regards its intrinsic worth, it stands entirely upon Grecian foundations. The chief reputation of its physicians, therefore, depended, for the most part, upon their great and comprehensive erudition; in the practice of medicine upon their perfect knowledge of the pulse, their uroscopy, their medical combinations, amulets etc. Yet they constantly advanced novelties in the sciences subsidiary to medicine, materia medica and pharmacy, from the latter of which chemistry, pharmacies and the profession of the apothecary were developed. These very acquisitions in the subordinate departments supplied the fruitful seed — no germ possessed of genuine vitality for the intellectual development of humanity, is ever entirely lost — to which, at a later period, medicine was greatly indebted. Moreover the Arabians increased our nosological knowledge by the first description of several epidemic, and other, diseases of the skin, and, in this respect, accomplished even more original work than the Byzantine physicians. Finally they enriched the cosmetic art, an art which seems a field of medical labor for only a moderate number of our "specialists" of to-day, but has mostly fallen into the hands of barbers and female hair-dressers.

Obstacles to higher advances on the part of the Arabians, as of most Semitic peoples, were in general their speculative and receptive, rather than productive disposition, which rendered them more men of learning than independent originators in the department of medicine; their talent for observation, efficient only in minute details; their predominant imagination; their inclination to subtilties, distinctions and speculation; and, greatest of all, their religious belief, to which e. g. the simple thought of dissection of the human body would have been a mortal sin, as it is to-day with their descendants (and the Turks). For the same reason they were unable to advance surgery, while their backwardness in midwifery was due to their exclusion of male obstetricians.

On the whole, however, the Arabians were, in spite of all this, of more importance intellectually than the Christians of the Middle Ages. They had a national poesy, architecture and music (they were the inventors of the violin), as well as a system of historical composition, and they cultivated the sciences of chemistry, botany, optics, mathematics and astronomy. In the latter science they surpassed even the Greeks, and laid the foundation of the advances of the 16th and 17th centuries. We need recall merely the Toledo tables of the 11th century, those of Ilek Khan and the contemporary Alphonsine tables of the 13th century (particularly perfected by the Arabians), without which modern astronomy would have been impossible. Last, but not least, there was among them even a certain irreligiousness, — a superiority in the sense of opposition to *so-called* religion, e. g. Ahmed ben Jahja (el Rawindi, the heretic, about 900), Averroës etc. In cases of sickness too they sought, when possible, a rational physician, at a period when the Christians (as some of them do to-day) ran to a wooden or stone idol, or to the bony or ragged relics of some saint, in order to pray before, or even to, them for health.

The mode of transfer of Greek medicine to the Arabians was probably as follows:

The inhabitants of the neighboring parts of Asia, including both the Persians and Arabians, as the result of multifarious business connexions with Alexandria, came, even at an early date, in contact with Grecian science, and by degrees a permanent alliance was formed with it. In a more evident way the same result was accomplished by the Jewish schools in Asia, the great majority of which owed their foundation to Alexandria. Such schools were established at Nisibis, at Nahardea in Mesopotamia, at Mathæ-Mechasja on the Euphrates, at Sura &c., and their period of prime falls in the 5th century. The influence of the Nestorian universities was especially favorable and permanent, particularly the school under Greek management founded at Edessa[1] in Mesopotamia, where Stephen of Edessa, the reputed father of Alexander of Tralles, taught (A. D. 530).

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[1] The school of Edessa was founded at an early period, but, falling under the influence of Nestorianism, it was broken up in 431. Revived under bishop Ibas (435-457), after his death it was again, and finally, dissolved by the emperor Zeno A. D. 489. Most of the teachers of this school fled into Persia and united themselves with the school of Jondisabur. Some however under the lead of

The college of Jondisabur (Gondisapor, Nishapoor), which had Greek teachers even as early as the time of Sapor (Schapur I., 240–270, founder of the dynasty of the Sassanides, 226–636), was already very influential under Chosroës I. Nushirvan (A. D. 531–579), but did not attain its greatest importance until the 7th century.

The Jews and Nestorians (as we have already seen in the example of Ahrun), by their translations of Greek works into Syriac, first made the Arabians acquainted with the Greeks. Translations were then made, by far most commonly, from the Syriac into the Arabic, which explains the frequent corruptions of the sense, particularly in the works of Aristotle.

By the term "Nestorians" are to be understood the followers of Nestorius, who exist in considerable numbers even in these modern times, especially in Asia, and even in China and India. Nestorius was made patriarch of Constantinople in 428, and, after a life of vicissitudes in upper Egypt, died in exile 440. He was one of those quarrelsome, obstinate, priests, devoted to the sifting of words and dogmas, who brought the Byzantine empire to confusion and disgrace. He taught, for instance, the correct doctrine that Mary should be called not "Mother of God", but "Mother of Christ", and that in Christ the two natures, human and divine, must be carefully distinguished. This doctrine, however, was disputed so obstinately and pertinaciously by the still more quarrelsome and litigious Monophysite, Cyril, that even numerous extra councils, held one after another especially to settle this controversy (Synod of Rome 430, Council of Ephesus 431, Council of Chalcedon 432), as well as the interference of the emperor Theodosius II.[1] (408–450) produced no agreement, and the empire, through such trifles, fell into confusion. The Nestorians were, therefore, banished in 439, and in 489 their school at Edessa, where the Arabians also were educated as physicians, was dissolved. The teachers scattered themselves throughout all Asia, and founded in 490 a new school at Nisibis in Mesopotamia, an impregnable Persian frontier fortress, which in the 8th century fell into the hands of the Arabians.[2]

Still more influential in the transfer of Grecian science to the Arabians was the banishment of the "heathen" philosophers of the last so-called Platonic school of Athens, by the "Christian" despot Justinian I. (529). These philosophers were well received at the court of the infidel Chosroës,[3]

Barsumas, founded a new school at Nisibis in Mesopotamia. The school of Edessa had contained many excellent teachers, and possessed a public hospital in which the pupils were instructed in the details of medical practice. Ibas, with the aid of Cumas and Probus, translated into Syriac the works of Aristotle. (H.)

[1] Under his reign the temple of Æsculapius, on the southern slope of the Acropolis, "to which the old faith clung most obstinately" (Gregorovius), was destroyed.

[2] These Nestorian schools were the first to require an examination before granting a certificate to practice, and also the first to separate pharmaceutics from medicine proper. (H.)

[3] Chosroës was also acquainted with Indian savants. His ordinary physician Barzôi (Burzweih) introduced the game of chess into Persia. (Baas.) Burzweih also translated into the Pehlevi dialect the Indian work Panchatantra, known in modern times as the "Fables of Pilpay". This popular work was translated into the Arabic by Ibn el-Mocaffa (died 762), under the title "Calila and Dimna", and thence into most of the languages of Europe. The first English version appeared in 1570. (H.)

and in return manifested their gratitude by the propagation of Grecian science. The latter and its representatives were at that period more highly esteemed by the tolerant "Barbarians", than by the fanatical Christians — indeed so highly that Chosroës offered a suspension of hostilities for the single physician Tribunus.

From all these causes it resulted that, even as early as the time of Mohammed[1] (571–632), physicians educated in the Grecian doctrines lived among the Arabians. One of these, Haraph ben Kaldaht, of Takif (who studied at Jondisabur, settled in Tayef, was the ordinary physician of Abu Bekr, and died of poison A. D. 634), was recommended by even the vigorous and uxorious prophet. Indeed Greek physicians themselves were permitted to sojourn as practitioners among the Arabians, as did e. g. Theodunus and Theodocus[2] in the 7th century — certainly a fine example of Arabian toleration! Finally it should be stated with all commendation, that the caliphs, in contrast to most of the Byzantine emperors, vied with each other in the promotion of science, and some of them even took part in the course of instruction. Arabian culture (and of course Arabian medicine) reached its zenith at the period of the greatest power and greatest wealth of the Caliphate in the 9th and 10th centuries. At that time intellectual life was rooted in the schools of the mosques, i. e. the Arabian universities, which the great caliphs were zealous in founding. Such Arabian universities arose and existed in the progress of time (even as late as the 14th century) at Bagdad,[3] Bassora, Cufa, Samarcand, Ispahan, Damascus, Bokhara, Firuzabad and Khurdistan, and under the scholastic Fatimides (909–1171) in Alexandria. Under the Ommyiades (755–1031), after the settlement of the Arabians in Spain in the beginning of the 8th century, were founded the famous universities of Cordova[1] (possessing in the 10th century a library of 250,000 volumes), Seville, Toledo, Almeria and Murcia under the three caliphs named Abderrahman and Al Hakem. Less important were the universities of Granada and Valencia, and least important of all, those founded by the Edrisi dynasty (800–986) in the provinces of Tunis, Fez and Morocco.[2] In spite of all these institutions the Arabians possessed no talent for productive research; still less, like the ancient Semites, did they create any arts, save poesy and architecture. Their whole civilization bore the stamp of its foreign origin. Even their very religion was a mixture of Jewish, Christian and all other sorts of ideas.

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[1] Mohammed himself, like all prophets, dabbled in medicine also; for in the case of a friend suffering from angina, instead of resorting to silly prayers and ceremonies, as a "Christian" priest at that time would certainly have done, he is said to have judiciously applied the actual cautery. Still in his time prayers and exorcisms naturally passed among the Arabians as remedies for disease, bodily injuries and the "evil eye" of demons and spirits (a subject of dread even to-day in the whole Orient). This is proven by a papyrus of the 9th century in the noble collection of the archduke Rainer (a unique MS., adorned already with ornamental cuts in wood), in which are found prayers for protection by Abu Dudschana (died 633), a companion of Mohammed.

[2] Two Greek physicians in the service of Hejaj ben Yusuf, prefect of Irak (about 689), a sanguinary and deformed monster. Theodunus is said to have written some Pandectæ medicinæ. Leclerc considers the two names to represent the same person. (H.)

[3] The most famous of the Arabian universities. It was founded by Almansor (754–775), whose still more famous successors, Harun al Raschid (786–808) and Al Mamun (812–833), were also patrons of science. Motawakkel (847–861) restored the university and its library. The annual budget of the caliphs allowed these universities a large stipend. Under Harun it amounted to $57,812,500, for that period an immense sum. (It may be of some interest in the question of medical fees to remark that in the West a silver standard, and in the East a gold standard, prevailed.)

These so-called Academies of the Arabians were true imitations of the school of Alexandria (which, as we have already pointed out, exercised the greatest influence upon Arabic culture), and indirect successors of the old Egyptian and Jewish sacerdotal schools in Asia, as well as forerunners, and probably also models, of our modern universities, which must accordingly be referred, at last, to ancient Egyptian models. They often included large blocks of buildings, indeed miniature cities, as must have been the case e. g. at Bagdad. Here were collected (as was the case with the western universities at their origin only) at one time, and from all portions of the world, 6000 savants and students, while the most popular German university of to-day cannot exhibit half of this number. These Arabian academies, however, included not only the lecture rooms, but also — part of them at least — hospitals and pharmacies, and especially the residences of the teachers and many of the students. Besides these there were rooms for the reception of the libraries, which by themselves alone must have been considerable, since, as we have just mentioned e. g. at Cordova, they are said to have contained a great mass of books. Some of these institutions, especially the later Spanish universities, enjoyed such reputation as scientific schools, that many students went to them from even Christian countries, in order to acquire a higher education. This was particularly the case with the Jewish physicians scattered everywhere throughout Europe. By them also, as is well known, was indirectly introduced again into the West, especially into lower Italy, a portion of the science of the Ancients. These medical institutions were, however, only secondary affairs, since theology, philosophy, mathematics, physics, astronomy and astrology were the chief subjects of the Arabian educational course, and medicine was nowhere taught separately from these branches. When a student had passed his examination he also received the venia legendi (igâze, liberty to teach). Among the special medical branches, practical anatomy was utterly excluded by religious belief, and midwifery and gynæcology were then (as almost universally in the East to-day) forbidden to men. The practice of operative surgery too was considered unworthy of a man of honor, and was permitted only to the despised lithotomists and similar persons of the lower class, who, in conseqnence of the fatalism of the Arabians (in spite of the remarkable tolerance of the Orientals, even to-day, for painful operations), were very rarely allowed to have recourse to the knife.

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[1] This city [founded by Abderrahman III. (912–961) and Al Hakim II. (961–976)] contained under Arabian rule 300 mosques, 200,000 houses, 1,000,000 inhabitants, and was called "The Center of Religion, the Mother of Philosophers, the Light of Andalusia". To such an elevation was it raised by the Arabians. The indolent and most Catholic Spaniards, however, converted it into a neglected den! Yet no state had so influential a priesthood!

[2] Schools were also founded at Herat, Ispahan, Bassora and Bagdad by Nizam el Moulk, the famous minister of Alp Arslan (1063–1072) That of Bagdad was called Medressat Ennizamia, and soon became one of the most famous of its day. Schools were founded at Bassora and Cufa by Schurf el Dowlat, emir of Irak, about 988. The university of Bagdad was reorganized by Al Mostanser (1226–1240), who provided regular salaries for its professors, collected a new library, established a new pharmacy, and even took part himself in the instruction of the students. (H.)

"Operations performed by the hand, such as venesection, cauterization, and incision of arteries, are not becoming a physician of respectability and consideration. They are suitable for the physician's assistants only. These servants of the physician should also do other operations, such as incision of the eye-lids, removing the veins in the white of the eye and the removal of cataract. For an honorable physician nothing further is becoming than to impart to the patient advice with reference to food and medicine. Far be it from him to practise any operation with the hands! So say we!" Even the extraction of teeth was avoided, and, although dentistry was cultivated, as among the Ancients, it was practised only by the lower class of physicians, the assistants etc. Yet the higher physicians — Thabit ebn Senan e. g. cured the stump of a hand that had been cut off — seem always (though not frequently) to have practised surgical operations, and it even appears that they, as among the Greeks, probably operated in person as obstetricians in very difficult cases of labor. They certainly watched over the practice of midwifery by the lower surgeons and midwives, just as the physici puri did among us until the present century.

Medicine proper was chiefly taught. Chemistry, pharmacy and materia medica and, indeed, the history of medicine were also well cultivated.

The teachers (Rabban) were installed in their offices with a certain ceremony, a custom transmitted from the Jews to the Syriac Christians and later Nestorians of Nisibis, from these to the Arabians, and from the latter to the Christian schools of the West, which found in the Arabian academies their models. The teachers also enjoyed private practice, or were physicians-in-ordinary. Moreover they received a salary from the state, which was raised by some of the rulers to a considerable sum. Abd el Letif e. g. received a salary of $240 per month — a large sum when we consider the value of money in that day. Many of them belonged to the Nestorian sect, and their audience was composed of Christians, Jews, Arabians and Persians. The text-books which formed the basis of their lectures were Galen, Hippocrates, Oribasius, Dioscorides, Aëtius, Paul &c., the reading and explanation of which, with exercises in dialectics,[1] were the chief objects of instruction. Personal observation was less cultivated, though clinical instruction was also imparted. Indeed Rhazes writes: "A thousand physicians, for probably a thousand years, have labored on the improvement of medicine; he who reads their writings with assiduity and reflection discovers in a short life more than if he should actually run after the sick a thousand years." Yet, on the other hand (like Paracelsus), he confesses that "Reading does not make the physician, but a critical judgment, and the application of known truths to special cases".

Before students (who were forced to gain their own living in part and were partially supported by stipends) were received, they were compelled — at least this fact is known as regards the school of Jondisabur — to exhibit their proficiency in certain branches of knowledge, and to pass a kind of Arabian examination for matriculation!

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1. Dialectic tournaments, similar to those of the later Scholastics, were customary among the students and between the teachers, even in the presence of the caliphs.

During their attendance upon the universities the Arabian students made botanical excursions, just as in the German universities of a later period. Finally, they were compelled, at least occasionally and in certain cities like Bagdad etc., to pass an examination (our examination for the Doctorate) before an examining board. This examination (as has been the case for a long time too in some of our Christian institutions) seems occasionally to have been made very light. Of course the Arabian professors had not only sons and daughters, but also a whole harem to provide for.

"An old, but well-clad, Arabian applied for a medical examination to the President of the college of Bagdad. At the very first question of the President the old man drew forth his purse and shook out its contents. Although he could neither read nor write, this jingling answer was sufficient, and he was given a diploma, with the conditions that he should never administer either active purges or emetics, nor perform venesection, but merely employ with his patients oxymel and syrup,"—a degree, therefore, about equal to our doctor externus, which, until a short time ago, was granted upon similar principles.

Besides these institutions (especially in the early period of Arabian culture) physicians were also instructed by their elder professional brethren. It is characteristic of the inheritance of medical knowledge, and a fact which we notice also among the Greeks, that there were entire families devoted to medicine, who flourished for long periods. If we draw our conclusions as to the number of physicians among the Arabians from the number of the teachers and students of a few schools, and from the number of their medical authors (a mode of computation well authorized), this number must have been great. Indeed Oseibiah alone enumerates as many as 399 of considerable distinction, and in the middle of the 10th century in Bagdad alone there were 860 physicians—about as many as in Berlin in 1876. They were especially devoted to internal diseases, and the Arabians have been reproached with having especially promoted the division of the profession into physicians of internal diseases and surgeons. Among the latter were specialists (including oculists) who busied themselves only with the disreputable operation of lithotomy, or with operations upon the eyes etc. A regular physician would rarely meddle with surgery. Yet operations seem to have been performed occasionally by even the most distinguished physicians. The Arabian physicians were great savants, mathematicians, botanists, chemists or alchemists, zoologists, translators, philologists and philosophers. Many were also poets, others praised and glorified by poets — a characteristic piece of amiability among the Arabians; for among Ancients as well as Moderns it is customary to write satirical poems only upon physicians.

The pictures which have been drawn of physicians, as a class, make them appear in a rather unfavorable light. In order, however, to judge matters more mildly and with greater justice, we must always remember that Arabian circumstances and customs are not to be squared with our rule. In this way many things will appear in a more tolerable light. The relations of medical colleagues to each other among the Arabians were not always particularly good. Besides the detraction and calumniation customary from all time (medicus medicum odit), they had recourse in some cases to actual poisoning in order to get rid of a colleague, a practice of which we have no examples in the most recent times! — Physicians visited the sick at their homes and had "office hours" in their residences, which appointments seem, however, to have been less confined to precise hours than with us. In some institutions there was a sort of "Policlinic". As regards Arabian practice it strikes us above all that even the great Arabian physicians were not free from a straining after effect and a passion for surprises. Thus, on one occasion, a man fell down in the street when a physician of undoubted reputation was in the vicinity. The physician, taking in his hand a cane and summoning the bystanders to follow his example, began to beat the sick man upon the soles of his feet and upon his body, until he was somewhat aroused. Thereupon the others were encouraged and followed the physician's example, and, when the sick man finally came to himself, everybody among the Arabians praised the cleverness of the doctor. Another physician promised to cure the favorite wife of the caliph, who had paralysis of the arms. Having collected the whole court, he directed the young woman to enter, immediately ran up to her and — threw her clothes over her head! She on the instant (in the hope of helping herself somewhat!), moved her arms to put them down again. Again the Arabian physicians had recourse to mysterious procedures and busied themselves specially and immoderately with uroscopy and astrology, branches which were subsequently transmitted by them to the West. In accordance with the first mentioned tendency they wrote with a purgative ink (perhaps prepared with the juice of colocynth, scammony etc.) certain charms in cups, in order to purge the faithful mysteriously, just as, even in the present century, we used to employ quassia cups, in order to have a stomach bitters always at hand, or to prepare it for ourselves by pouring into the cup a little spirits, as Daubitz said, as often "as any one believed it necessary to take it". From the urine pregnancy was diagnosticated, and even the sex of the child foretold.

Much swindling, and charlatanry too may have crept in,[1] perhaps in consequence of a surplus of physicians. Possibly also self-deception through ignorance or excessive imaginativeness, or intentional deception with the design of producing an impression, may have had its share in the peculiarities of Arabian practice. Thus the physicians promised to the caliph Watek Billah, who suffered from dropsy, fifty years more of life, and shoved him several times into a heated oven, until (far beyond their original promise) he was cured forever! — Moreover the Arabian physicians enjoyed a good reputation as prognosticians and diagnosticians. What kind of diagnoses they sometimes made may be inferred from the following anecdote: Thabet ebn Korra diagnosticated a disease between the ribs and the pericardium, not at all from the local phenomena, but as follows: "I showed him my urine glass, and he saw in it what was hidden between my ribs and my pericardium." And without needing to trouble himself, like us poor doctors, with anatomy, pathological anatomy, auscultation and percussion, and even the post mortem, "the concealed disease appeared to him as a stain on a polished sword looks to the eye", — a better result than we can attain with all our accessories! Their fee seems always to have been stipulated in advance — a point in which the Arabians were ahead of us until recently. When a patient declared that he was only growing worse, the physician demanded at least half the stipulated fee, since he had, at all events, converted an originally tertian fever into a semi-tertian, and Isaac Judæus gives the discreet counsel to stipulate the fee during the course of the disease, and to fix it as high as possible; for after recovery recollection of the service rendered declines rapidly. He also advises against gratuitous treatment, because one gets no thanks for it — an experience which the Arabians had already made. Physicians-in-ordinary and court-physicians enjoyed high salaries,[1] and often, as the result of a few successful cases, attained to great wealth. In case of ill success in their treatment, however, or bad humor in their masters, they were exposed to abrupt reverses of fortune. Sometimes they were subjected to imprisonment and even whipping, just as the German military physicians down to the middle of the 18th century were put into the stocks. For the existence of military physicians in the Arabian armies we have in evidence the circumstance that they were, without doubt, provided with field apothecaries and field pharmacies at least, the latter of which were often inspected by the Generals themselves. Moreover there were veterinary physicians among the Arabians (at least we may so conclude from their veterinary authors), and finally there must have been a kind of female physicians, since certain operations on women, such as lithotomy, replacing the prolapsed uterus etc., could be performed by women only. Besides all the covered portions of the female body were prohibited from being stripped by strange men, and of course least of all could the sexual organs be touched by them. Possibly, however, these female physicians were merely midwives. The latter were the only obstetricians (as with us until the 18th century), and they performed the bloodiest operations, such as embryotomy, even lithotomy etc. It must still be mentioned that there were apothecaries in the hospitals, as well as others unconnected with those institutions, and that male and female nurses were also employed. The better physicians existed for the rulers and the wealthy only; the common people, in the great majority of cases, employed simple popular physicians (*tubib*), conjurors, jugglers etc., for according to the Koran actual medical treatment, as well as the study of medicine, was simply tolerated, while to the most devout believers it was regarded an infringement upon the sphere of Allah. Even from the better physicians of the rulers miraculous cures were expected, rather than regular medical treatment. — Besides the hospitals of the Arabians connected with their academies, there also existed in many places others, which (in contrast to the Christian monastic hospitals of the Middle Ages) were always managed by physicians. Such was e. g. that founded by the caliph Abd el Melik in the year 707. Similar lay-hospitals existed at Misr, Fez etc. Cordova had 40 such hospitals, but the greatest was at Cairo, and was endowed with genuine luxury, both as regards its arrangements and its medical staff. It was founded in 1283 by El Melik al Mansur Gilâvûn, and might serve in many respects as a model institution even to-day.[2] It possessed a physician-in-chief (who held lectures in a special room), male and female nurses, special wards for wounds, diseases of the eye,[3] diarrhœal diseases, fevers (this ward was cooled by fountains), a room for women, another for convalescents, and rooms for the storage of food, drugs and other stores etc. The house was arranged for the sick of all conditions, and the number of the patients was not determined beforehand. Inasmuch as it was united, however, to a mosque (in which the Koran was read and expounded day and night), and contained a law-school, library, orphan asylum etc., it was quite similar to the academies. The general condition of public hygiene among the Arabians may be inferred from the picture of Cairo given by the Egyptian historian Al Makrizi (15th century): "The inhabitants make it a habit to throw out into the streets all dead animals, like cats and dogs, that die in their houses, together with the refuse of their dwellings, remnants of food, dirty water etc. All this calls forth in the narrow streets, into which no currents of air can force their way, an insupportable and very unhealthy stench. Then they all drink the water of the Nile, into which their sewers (so they had sewers!) empty, and in which the bodies of animals are everywhere floating. If you go out of a morning in a clean caftan and turban to attend to your business, your clothing is soiled, your beard and eyes are full of dust: for no draughts of air make their way into the streets to disperse the dust raised by men and beasts. If, however, you go out in the evening to take a walk, from all the houses, and particularly from the large fireplaces, ascends a smoke, which darkens the heavens and makes the atmosphere appear black and murky. Besides all this, the bad fish, which in the winter and spring are brought from the sea for sale, diffuse an abominable and very pernicious odor. The wealthy, therefore, prefer to live in Higelesch-Scharaf, situated to the south of the city, because there they drink the water of the Nile before it has been defiled by the city. From all this I think it explicable why the inhabitants of Cairo fall sick easily. For this reason too the Ancients placed the capital of the country at one time at Memphis, and then at Alexandria. The healthiest place in Fostât is, undoubtedly, that in which they bury their dead." In the conservative Orient affairs are in the same condition exactly to-day!

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[1] Under this head belong the medical prescriptions regarding the daily use of laxatives and the enjoyment of coitus but once a month—prescriptions which must certainly have been observed less strictly among the polygamous and nervously uxorious Arabians, than among the Egyptians. The Christian princess Isabella I. of Aragon published in 1496 a law for the protection of "married women", according to which the latter need not permit coitus oftener at most than six times a day (what men!). Luther, on the other hand, is said to have recommended it twice a week; so that either he puts to blush the Arabians, or the Arabians him!

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[1] In the Arabic states of the present day these are arranged upon a lower scale. Thus in Morocco Gerhard Rohlfs received, as physician-in-ordinary, a daily salary of about six cents, though he treated his patients on native principles, i. e. he wrote amulets and amulet-like recipes, to be taken in water etc. There are no longer any regular physicians there now, though apothecary-shops exist and are supplied with the "latest novelties". Even in the 15th century—in the time of Leo Africanus (Alhassan), the geographer—the great native and foreign physicians of the meridian of Arabic culture were entirely forgotten, and physicians and surgeons no longer existed there.

[2] The hospital "Moristan". According to Leclerc it was founded by the Fatimite caliph Moez Ledinillah (953–975), and was originally designed for the insane only, but was afterwards thrown open to the sick of all classes. It was restored by the Mameluke sultan El Munsoor Kelaoun (1279–1290) in 1286, and a school of medicine was added thereto. Under the auspices of the sultan Kelaoun also appeared a treatise on hippiatrics and hippology, entitled "Nacery". (H.)

[3] Separate ophthalmic wards were not introduced among us until the present century. Oseibia's uncle Reschid-ed-din-Abul-Hassan Ali was the director of such a ward in Cairo.

The so-called Arabian physicians, whose golden age falls between the 8th and 13th centuries, were also the instructors of the physicians of the West in Grecian medicine. Even as late as the 17th century their writings were the text-books for lectures in the universities. The earliest Arabian physicians to distinguish themselves were members of the Nestorian family of Bachtishua (i. e. Servants of Christ, flourished 750–1050), all of whom were famous translators. Of these

JURJIS (George)

was called in 772 by the caliph Almansor from Jondisabur to Bagdad. His son

BACHTISHUA BEN[1] JURJIS

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[1] In Arabic proper names Abu or Ebu signifies father; Ben, Ebn, Ibn, son or descendant; al, el, er, il, is the article, and the name following gives the native country, place of birth, father's occupation etc. The Arabic sounds are not so sharply defined to our ears that variations in the mode of writing cannot arise. In the West, Arabic proper names often undergo such changes that the original and correct orthography is no longer recognizable. As examples we may quote Rambam, Abimeron, Avicenna etc. These changes are noticed in their appropriate places. (Baas.)

[In the English translation an effort has been made to replace the (to the English eye) rather uncouth combinations of German orthography by a simpler mode of spelling, where such changes would not occasion mistake. Thus the German Dschordschis has been changed into Jurjis; Dschabril, into Jabril etc. (H.)]

cured the caliph Harun al Raschid of an attack of headache by bleeding him; while his grandson Jabril (Gabriel, died 828) saved the life of the same caliph in an apoplectic attack. The latter, in his earlier successes and later and sudden misfortunes, was a genuine type of the Oriental physician-in-ordinary. The later descendants of this family,

JURJIS BEN BACHTISHUA (9th century),
BACHTISHUA BEN JABRIL (died 870),
JAHJAH (John) BEN BACHTISHUA (about 900),
BACHTISHUA BEN JAHJAH (died 940),
OBEIDALLAH BEN JABRIL (about 940),
JABRIL BEN OBEIDALLAH (died 1006) and
ABU SAID OBEIDALLAH (died 1058),

only partially attained the reputation of their ancestors.

Another Nestorian, and physician of Harun, was **JAHJAH EBN MASEWEIH** (780–857, Mesuë the Elder, Janus Damascenus),

distinguished as a translator and teacher. He, like all the later Arabians, discarded the strong purgatives of the Greeks (scammony, Nile-corn etc.), recommending in their stead the mild Arabian laxatives (tamarinds etc.). He also declared that the small-pox was a fermentation of the blood necessary for all men. His pupil

HONAIN EBN ISHAK of **HIRA** (809–873), called in the West Joannitius,

was a Nestorian teacher at Bagdad and a court physician, equally famous with his master for his translations, for each of which he received the full weight of the manuscript, told down in gold. He distinguished himself by subtle elaboration of the Galenic doctrine of forces and humors (assuming 4–6 chief forces and the necessary secondary forces, as well as five kinds of bile of all colors, as red, greenish-yellow, lemon-yellow etc.), and followed in part the Methodists. With Plato he considered the uterus a wild beast, possessed with a sore longing for semen. He also assumed that it wandered about in the body, and proposed by the use of pleasant odors and ointments—introduced into the vagina—to entice it downwards, or with bad odors to drive it away. The odor of garlic or of burnt hair serves the latter purpose, and is considered useful even to-day for hysterical persons, whose emotions (though not their uteri) are well known to be very unstable. Normal presentations are those of the head or feet. In fleshy persons he advises the knee-elbow position, and suggests the same in instrumental cases and in the introduction of suppositories into the vagina, in order to entice the child downwards. Midwives alone should operate. In respect to therapeutics he was, in the main, a follower of Hippocrates, and he was also a good oculist. His sons Ishak (died 910) and David were also translators.—About the same period lived

JAHJAH EBN SERABI (Serapion the Elder) of Damascus (802–849),

author of a compilation written originally in Syriac, and afterwards translated into Arabic. It was entitled "Aggregator", and contained descriptions of a disease of the head called "Soda", meningitis = Karabitos, rachitis = Hada, and of an eruption = Essera. Hysteria he ascribes to a want of sufficient sexual intercourse, —hence its frequency in widows and old maids.

ABUL ABBAS AHMED BEN MUHAMMED BEN MERWAN EBN EL TAJJIB EL SERACHFI (died 899),

physician to the caliph el-Motadhed, by whose order he was put to death, translated into Arabic a book of Hippocrates and also wrote an "Introductio in artem medicam."

While Galen classified simple medicines into grades and qualities,

Yacub ebn Ishak el Kindi (Alcuindus, 813-873),

an Arabian who equalled him in fertility as a writer (he composed more than 200 treatises), employed the doctrines of geometrical proportion and musical harmony in explanation of the effect of compound remedies. His example was followed almost down to our modern times, crude and preposterous as it appears. Thus,

Cardamon is	1° warm,	½° cold,	½° moist,	1° dry,
Sugar is	2° "	1° "	1° "	2° "
Indigo is	½° "	1° "	½° "	1° "
Emblica is	1° "	2° "	1° "	2° "
Sum	4½° warm,	4½° cold,	3° moist,	6° dry.

As the warm and cold are equal, and the dry twice as much as the moist, the above prescription gives us a compound dry in the first degree.

An equally fruitful writer was the contemporary of Alcuindus **Thabit ebn Corra** (836–901); whose sons

Ibrahim ebn Thabit ben Corra and

Abu Said Sinan ben Thabit ben Corra (died 942), and grandson

Thabit ebn Sinan (died 973)—all of them were called "The Sabians" —were presidents of the medical college at Bagdad.

Another later (Spanish) Arabian physician **Ebn Wafid** (Abenguefit, 997-1075),

in his treatise "On the powers of Drugs and Aliments", and in similar speculations on the action of drugs, shows himself a partisan, as we have seen in the case of Alcuindus. — One of the most distinguished Arabian physicians was the Persian

Mohammed Ebn Zakarijah Abu Bekr er Razi (Rhazes, also corrupted into Abubertus, Abubater, Bubikir, Abubeter), originally a cithern-player,[1] born A. D. 850 at Rai (hence Arrasi, el Razi), later an active teacher at Bagdad, who finally died, poor and blind, in his native city in 923 (932 ?, 1010 ?).

Equally great as a philosopher and a medical writer, the "**el Hawi**" (Liber Continens) passes for the masterpiece of his (237) works, while his "Aphorisms" were used for an extremely long period as a vade mecum.

In surgery and the treatment of diseases of the eyes, especially in the operative branches, his knowledge is considerable. He is acquainted with the operative procedures in trichiasis, en- and ec-tropion, the extraction of cataract (suction?), tracheotomy, tonsillotomy, the operation for fistula lachrymalis, the reduction of fractures and dislocations by means of machines, the treatment of abscesses, burns (in which he advises a mixture of snow and water), necrosis, caries, hare-lip, fistula, recognizes fracture of the penis etc., while his gynæcological and obstetrical remarks relate to retroversion of the uterus, hydrometra, mole pregnancy, shaking the parturient woman, and finally embryotomy for the relief of labor, the well known culbute etc. In dietetics he advises against the weaning of children in summer. Like a genuine

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[1] Other physicians besides Rhazes were famed for playing upon the flute etc.—evidence that among the Arabians music stood in high esteem at a period when in the West this art was almost unknown, or at least disregarded.

Arabian he thought he could determine in primiparæ the number of future children by the number of abdominal wrinkles! In pathology he follows Galen almost entirely, "since otherwise the widely differing opinions of the Ancients lead to embarassment" — a statement which, however, may be still more truly made of our modern authors. On the other hand, he is one of the earliest and most important dermatologists, and his famous description of the small-pox (first mentioned in a lost work of Ahrun, presbyter in Alexandria in the 7th century) and measles is new and original, though in the therapeusis he follows Hippocratic principles. A proof of his therapeutic insight is found e. g. in his preference of food to drugs, whenever the former may suffice, and among drugs, his preference of the simple to the compound. With respect to venesection he gives the rule to open the vein longitudinally, and recommends in hepatitis opening the vein of the right arm, in hæmatemesis, the veins of the foot etc. Purgatives he rejects. His Semeiology and Prognostics, with the exception of the indications to be derived from the urine and the planets, are famous, while his anatomical and physiological knowledge never exceeds that of Galen. Yet he mentions the double recurrent nerves, the infra-trochlear branch of the nasal. the trigeminus etc. Children, he holds, originate from a mixture of male and female semen (male children, in case the male semen is more vigorous, female, when the female semen is the stronger) etc. In respect to Materia Medica he teaches the external use of the preparations of arsenic, mercurial ointment and sulphate of copper, and the internal employment of brandy, saltpeter, borax, red-coral and precious stones (the prescription of which induced the utmost fraud in pharmaceutics), as well as the chemical preparation of oil of ants. Moreover he does not consider it superfluous to write (in addition to many other subjects) upon the characteristics of the charlatan (a character of specially frequent occurrence among the Orientals) and the skilful physician, a subject upon which lectures ought to be given, or rather revived, in our universities, for this was done during the last century almost everywhere. That it is done no longer is due probably to the fact, that to-day we are often in doubt where the charlatan ends and the true physician begins.

A very short time after Rhazes lived the Persian physician **ALI BEN EL ABBAS** (Ali Abbas, died 994), who in his "el-Maliki" (Royal Book) treats in a scientific manner the whole subject of medicine, but according to his own statement, follows the Arabians in materia medica only, while in all other respects he is an imitator of the Greeks. He very properly demands of the physician that (as he himself had done) he should control the accuracy of the pictures of disease found in the books by his own observations at the bedside. He gives muscles to the eye, but occupies himself with teleological reflections as to the value of its different parts. In his dietetics (where he commends sugar as food for infants) he furnishes also an Arabian regulation as to clothing considered in a hygienic point of view, and notices likewise the necessity of taking into account the demands of habit. He is prominent among the Arabians as an obstetrical and ophthalmological writer. Yet he also considers the uterus a veritable beast, which longs for semen as its food. The extraction of the child and embryotomy, according to Ali Abbas, are allowable for midwives alone. His work was translated into Latin under the title "Pantegni" by Constantinus Africanus, the first author to introduce the Arabian writings into the West.

The treatise on materia medica and diet of Alhervi, and the compendium of pathology of Abu Jafar Ahmed ebn el Jezzar (Algazirah, died 1004) are also to be referred to this period.

"The Prince of Physicians" (el Sheik el Reis — he was also a poet) was the title given by the Arabians to

Abu Ali el Hossein ebn Abdallah ebn Sina (Ebn Sina, Avicenna, 980–1037), in recognition of his great erudition, of which the chief evidences are stored in his "Canon".

This work, though it contains substantially *merely* the conclusions of the Greeks, was the text-book and law of the healing art, even as late as the first century of modern times. It includes anatomy, physiology and materia medica. In it are mentioned camphor, iron in various forms, amber, terra sigillata, sublimate (he differs from Galen in the use of chemical remedies), cubebs, aloes, manna and many other drugs. He considers gold and silver as "blood-purifiers"; hence gilded and silvered pills are, in his view, specially efficacious. He also recommends urine and similar substances as remedies, while he advises bleeding at the outset of disease at a remote point from, towards the end, at a point contiguous to, the seat of the disease. Epileptics, according to him, should eat heartily at midday, less at evening. For patients suffering from consumption he prescribes venesection, and then gives sugar and milk; in diarrhœa he prescribes gentle laxatives. He also discusses compound remedies, and knows many "cordials" etc., in all which matters he shows himself a genuine Arabian.

His pathology makes prominent mention of mental diseases, and notices tic douloureux (described also by other Arabians), tetanus, "blueing of the eyes", three forms of inflammation of the chest—pleuritis, muscular rheumatism and mediastinitis—measles, the purples, albaras nigra etc. He is also said (according to Leichtenstern) to have been the first (?) physician to teach the contagiousness of phthisis.

In his general pathology and therapeutics he distinguishes, among other matters, fifteen kinds of pain, assumes four peripathetico-scholastic causes of disease (the material, efficient, formal and final causes), preserves the Galenic humoral pathology etc. In great coldness and in great heat he gives no medicines, and considers the same remedy good in one locality, which would be injurious if employed in another.

In surgery he calls the extraction of cataract a dangerous operation, but speaks in favor of depression; declines to operate on strangulated hernia; describes puncture of the bladder; the method of direct reposition of the head of the os brachii in dislocation, the method by which leeches and other foreign bodies when swallowed may be removed from the œsophagus, hardened wax removed from the meatus etc., while he prefers to loosen the teeth by means of the fat of tree-toads, rather than to pull them out. In obstetrics he follows the views of the earlier writers. In military surgery (according to Fröhlich) he taught only very little, and this he borrowed from the Greeks, without giving his own experience.

The history of Avicenna's life is as follows. His father, a reputable official, who, at the time of Avicenna's birth, resided at Afschena in Bokhara, supplied to him very early the foundation of all Oriental instruction, i. e. the knowledge of the Koran, which work he knew by heart as early as his tenth year. After this he studied grammar, dialectics, astronomy and geometry, learned from a merchant the Indian figures and arithmetic, then devoted his time to the Aristotelian philosophy, and finally turned his attention to the study of medicine, under the direction of the Nestorian Abu Sahel Mosichi and Abu Nasr Alfarabi at Bagdad. As early as the age of sixteen he was qualified to teach and practise this profession also. At a later period he became vizier at Hamadan, but was deprived of this office and even thrown into prison, where he wrote many of his medical works. He, indeed, recovered his freedom and his office, but, having fresh occasion to be apprehensive for his liberty, he kept himself concealed for a long time in the house of an apothecary. Finally, however, he was discovered and imprisoned in the castle of Berdawan. Again, in the garb of a monk, he fled to Ispahan, where he enjoyed renewed distinction, but, undermined in health by women and wine, he died during a journey to Hamadan, in the 58th year of his age.

His views as to what is allowable to a physician are characteristic of Arabian modes of thought and ideas. As a priest he could never employ reason; in his character as a philosopher, however, it was permissible to make some use of it. When e. g. it is asserted that jaundice is removed by looking at yellow objects, he will not, as a physician, question the fact, yet, as a philosopher, he cautions against superstitious remedies.

For the fact that Avicenna became at once the ruling "Authority" among the Arabians, and at a later period among the Christians also, the circumstance that commentaries upon his works appeared immediately (though he was himself only a commentator and compiler) speaks volumes.

Ishak ben Amran (about 900) of Bagdad was the founder of Arabian medicine in Africa and was crucified.

Ishak ben Soleiman (830-940) wrote on dietetic subjects and the deportment and conduct of the physician.

Using as a guide the elementary qualities, he determines the value, not only of the different kinds of flesh, but also of the special parts of one and the same animal. Although he was a Jew (hence called el-Israïli and Isaac Judæus), he declares pork to be very healthy. He was the first (?) to introduce senna. Very properly also he decides upon the qualities of spring water in accordance with its source, or in consideration of the climate, and gives directions for the baking of bread, a subject which, as we know, Liebig, in recent times, did not consider it superfluous to explain.

About the same period **Abul Hassan Garib ben Said** (about 830-930) composed some obstetrical treatises (the only specimen of his works which has been preserved to us), in which were considered the diseases of childbed and children, the means for increasing the semen, the method of recognizing the sex of the fœtus in utero, labor, suckling, the rearing of children etc., while

Ebn Serapion the Younger (died 1070),

in his work "On Simple Remedies" collected all the knowledge of the Greeks and Arabians on this subject. Spinach, nutmeg, musk, liquid amber, senna, asafœtida etc. are minutely described, while wonderful accounts are given of the procuring of asphalt, bezoar, diamonds and the magnetic stone. On materia medica and pharmaceutics (subjects in which his "Grabadin" served for a long period as the chief guide), as well as upon pathology, he wrote numerous treatises, which were used as text-books in the Christian schools as late as the 16th century.

Jahja ben Masewaih ben Ahmed (Mesué the Younger, died 1015) of Maradin on the Euphrates,

was a pupil of Avicenna, and ordinary physician of Alhakem II. (961-976) at Cairo, and is said to have been a Christian. He taught the so-called correction of drugs, the preparation of extracts etc.

The Christian physician **Jahjah ebn Jesla**, of Bagdad (died 1100), composed treatises on drugs and diseases in a tabular form, which were entitled "Takuim elabdan". He apostatized to Mahommedanism in order to be able to hear the lectures of Abu Ali ben Walid, and afterwards, abused both Jews and Christians, like a true renegade.

A rival of Avicenna in the fame won in the department of surgery is the Spanish-Arabian physician,

CHALAF BEN ABBAS ABUL CASIM EL-ZAHREWI (Abulcasem, Alzaharavius, Albucasis) of Elzahra (Zahera) near Cordova (936–1013). His medico-surgical text-book, entitled "Altasrif" (Compendium), much of which, like the works of many of the Arabians, is simply copied from the Greeks (Paul of Aegina and others), had until a late period almost undisputed sway. This is especially true of the tenth chapter on surgery. The indications for the actual cautery form the longest section of the work. This may be considered the Arabian national instrument, though it was also used almost exclusively by the later Greeks, who shrunk from the knife. It was recommended in numerous diseases, from feebleness of memory to spontaneous luxations and hernia, as well as for the staying of arterial hæmorrhage, when complete division of the vessel and styptics failed. The form of the instruments varied with the locality and object of the operation. His treatise on operations includes very numerous procedures, as ligation of arteries in their continuity, amputation (amputations above the knee and elbow he was probably the first to interdict as too dangerous — Wernher); suture of the intestine with threads scraped from the intestinal coat; the operations for hare-lip, ranula, exsection of necrosed bone, cutting of fistula (also the use of the ligature and the cautery), operations for goitre and aneurism, ligation of staphyloma, operation for cataract, puncture of the cornea, different forms of suture, lithotripsy (by implication), use of the silver catheter (instead of the copper ones used heretofore), exploring trocar, artificial teeth of beef-bone etc. Lithotomy in women should be performed by midwives under the direction of the physician, as follows:

"The finger should be introduced into the rectum of virgins, into the vagina of married women; then an incision should be made, in virgins to the left and below into the labium, in married women between the urethra and os pubis, so that in both cases the wound is oblique."

He performs venesection, after the manner of the Arabians, upon the sound side, and recommends the employment of the same with the view of prophylaxis, an idea from which subsequently originated a pernicious custom. (Stahl.)

Besides the surgical diseases already noticed from his treatise on operations, he recognizes a gangrenous epidemic erysipelas, warty excrescences, fractures (which, after the manner of his age, he rectifies by means of machines — a cruel procedure of which reminiscences still exist among the public) and wounds. His operative midwifery knows nothing outside of the same art among the Greeks, save the recognition of an abdominal pregnancy discharging by external suppuration. Plates of instruments adorn the work. He valued anatomy as an important aid in the practice of surgery.

In his pathology he recognizes crusta lactea, and the results of the use of mercury in the form of affections of the mouth and salivation, but follows in the main the teachings of Rhazes.

ABD EL MALIK ABU MERWAN EBN ZOHR (1113–1162, 1196?, Abimeron, Avenzoar), son of a physician, and probably a Jew, was also born in Spain, at Pentaflor, near Seville. He died honored as "The Wise and Illustrious", titles which he won by a freedom from prejudice, so extensive that he ventured to contradict even Galen, a hazardous undertaking, especially for an Arabian, at that period.

In his time too it was considered disgraceful to practise operative surgery. Nevertheless he, like Albucasis, practised it with marked distinction, excepting, however, lithotomy, which was also considered so excessively disgraceful among the Greeks. He even performed experimental operations on the lower animals, and, indeed, the first total extirpation of the uterus is ascribed to him, though his operation arose from confounding the uterus with an accidental abscess. In general, however, he was satisfied with plasters etc., and, indeed, proposed to remove stone in the bladder by the internal use of the oil of dates, and exostoses by the magnet.—In physiology, on the subject of the relative importance of organs, he calls attention to the fact that no organ can perform its functions properly without the aid of another (e. g. the brain or lungs without the liver), and that one cannot, therefore, distinguish any one organ as the most important. Further, in opposition to Galen, he assigns sensibility to the teeth and the bones, and holds that the continuance of life depends upon a correct crasis of the humors. In ætiological matters he lays stress upon the deleterious qualities of the air of swamps. His special pathology mentions pericarditis and pericardial exudation, consumption from abscess of the stomach, mediastinitis, growths in the stomach, salivary concretions under the tongue, quinsy from paralysis of the pharyngeal muscles etc. Therapeutically he recommends in inflammations venesection always on the sound side, the milk cure in consumption, considers—again in opposition to Galen—amaurosis curable etc. It is important to observe also the fact that his book "Taïsir", in which he records the foregoing results of his experience, avoids all subtilties, and lays down experience as the sole guide of the physician.

A pupil of Avenzoar was

Abul Welid Muhammed ben Ahmed ebn Roschd (Averroës) of Cordova, the Mohammedan "Spinoza" (Sepp), a man who exercised the greatest influence upon his own time and succeeding ages. He was a religious free-thinker, who, hiding himself behind the precepts of philosophy, awakened doubts as to the creed of the church, and the church accordingly hated him bitterly. He died at a good old age, in Morocco in the year 1198, after having suffered bitter persecution at the hands of his fellow-believers, in consequence of the pantheistic views awakened in him by the study of Aristotle, whose trustiest follower he was among all the Arabians. He was chiefly a philosopher, like almost all the Arabian physicians, but, by reason of his opposition to Galen, and of a few peculiar views preserved in his "Collijat" (Compendium), he deserves also a place in medicine.

With Aristotle (whom, as we know, the Nestorians had made accessible to the Arabians), he claimed sensibility for the heart, while in other respects he held it merely the place of origin of the arteries. He considered the ethereal principle inherent in the semen the only essential agent in generation, and declared the possibility, by means of this, that a woman might be impregnated in a bath, in which a short time before a man had had a seminal emission. He was prompted to the adoption of this opinion by the oath of a cunning wife, who had, at all events, got in a bad condition without the aid of her husband. The sense of sight he sought in the lens of the eye. The small-pox, according to his teaching, never befalls the same individual more than once. In therapeutics he rejects the employment of mathematical formulæ in the compounding of remedies, and holds, instead, that the duty of the physician consists chiefly in the application of general principles to special cases.

The distinguished Jewish-Arabian theologian, philosopher, mathematician, astronomer, jeweler and physician, Abu Amran Musa ben Meimun el Cordobi (**Rabbi Moses ben Maimon**, Maimonides, Rambam), during the persecutions which Averroës had to endure, even at the hands of his earlier patron Al Mansur Yacub (died 1198), king of Morocco and Spain, showed himself a generous pupil of that savant by supporting him and obtaining for him a refuge among the Jews. Maimonides was born at Cordova (1135 or 1139), and died ordinary physician to the sultan Saladin in Egypt A. D. 1204 or 1208.[1]

He composed so-called "Aphorisms", in the style of Hippocrates and Galen (whom he carefully followed), wrote on dietetics, hæmorrhoids, the causes and symptoms of disease, and furnished an improved method of circumcision. As examples of his dietetic prescriptions we may quote the following: "Honey and wine are injurious for children, but beneficial for the old, particularly in winter. In summer a third less quantity should be taken." "During sleep one should neither lie upon the face nor the back, but only on the side; during the early part of the night upon the left side, towards its close upon the right. One should not yield to sleep until 3–4 hours after supper, and should not sleep in the day-time." "Coitus is not fruitful when one is surfeited or hungry, but only when digestion is completed. Nor is it successful in the sitting posture or standing." (Oppler.) All of this is characteristic of the Arabico-Jewish fashion with its subtle refinements!

About the same period lived

Abd el Letif ben Jussuf ben Muhammed (1162–1231), a native of Bagdad.

He studied medicine in his native city and is famous for his description of his travels undertaken for the sake of studying the natural sciences. He composed 166 treatises relating to philosophy, medicine, history and philology — an exquisite example of the erudition and fertility of the Arabians. His "Improved Anatomy" is no longer extant This work contained, as the sole Arabian contribution to anatomy, the statement that the lower jaw (and the os sacrum usually) consisted of a single bone only.

Equally famous as a scientific traveller and learned botanist is **Abd, Allah ben Ahmed ebn el Beithar** (Ebn Beitar), who was "Teacher of Medicine" and vizier at Cahirah and died in Damascus in 1248.

His work on "Simple Medicines" is founded upon the writings of Galen, Dioscorides etc., together with his own observations. The latter enabled him to correct some mistakes of Dioscorides, whom in the main, however, he follows. His knowledge of plants surpassed considerably that of Theophrastus and Dioscorides (about 200).

The most famous medical historian among the Arabians was

Abul Abbas ebn Abu Oseibia Muwaffik ed Din (Oseibia, 1203–1273) of Damascus,

who, however, wrote also on medical subjects and mentions e. g. the chorda venerea, which he cures by laying the penis upon a stone support and striking it violently with the fist. His "Biography of Distinguished Physicians" treats of Arabian, Persian, Indian, Egyptian, Christian and other medical men.

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[1] The precise dates of many of these Arabian physicians vary according to different authorities. (H.)

Of less reputation than the foregoing physicians were :

EBN BADSCHDSCH (Avempas, Aven Pas, died 1138), who was poisoned by his "Colleagues";

ABRAHAM BEN MEIR (Avernezel, 1093–1168) of Toledo, who died in Rome ;

ABUL HASSAN EL MUKTAR EBN BOTLAN or Eluchasem Elimithar (died 1052) ;

HOSSEIN EL ISTERABADI (about 1155);

EBN DSCHEMI HIBETALLAH (12th century), a Jew, his pupil ;

EBN EL AINZARBI (died 1153);

EBN DSCHEMI ;

ALI RODWAN (died 1061 or 1068);

MECHITAR (about 1150), an Armenian ;

FAKR-ED-DIN EL RAZI (1149–1210), a philosopher and physician ;

The gynæcologists ;

ABD ER RAHMAN (about 1169), a physician of Haleb, author of an "Exposition of the Mysteries of Women";

EBN HOBAL MUHADDIB ED DIN of Bagdad (1117–1203);

GIJAT EL GEITH (about 1335), "On general medicine";

AHMED BEN JUSUF EL JAFEDI (about 1341), author of a medical compendium ;

NEFIS BEN AUDH, a physician of Samarcand (about 1424);

DAWUD EL ANTAKI i. e. "the Blind" of Misr,[1] (died at Mecca 1596);

The oculists :

ALI BEN ISA (11th century) el Kahal, i. e. the oculist, wrote a treatise entitled Tedhkireth el Kahalin, or "Admonition to Oculists";

ABUL KASEM OMAR BEN ALI EL MUSLY of Mosul (11 century) wrote a "Manthekel" or "Epitome of Ophthalmology";

KOTB-ED-DIN EL SCHIRAZI (1236–1311) of Shiraz, at once an astronomer, philosopher and physician ;

EBN EL NEFIS (Annafis, died 1288 or 1296, aged nearly 80), a famous jurist and juristic author of Damascus ; the Armenian

ALCANAMUSALI (about 1258), probably identical with Abulkasem Omar ben Ali, a philosopher and physician of Bagdad, who collected everything written on Ophthalmology by the Chaldæans, Indians, Jews and Arabians. However the Arabians produced nothing new in ophthalmology, although it was a department in which they frequently labored.

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[1] In the Oriental universities (medrese ; professor — muderris ; study — dars ; student, especially of theology, — softa) there are many blind students even at the present day. (These, however, are usually destined to be mueddins (who announce the hours of prayer). In 1875 the university Azhar had 321 professors and 10,780 students from all the countries of the East. They are divided into special riwâks, corresponding to the mediæval "Bursæ", and the latter owe their origin, doubtless, to the Arabian models. The most populous riwâk was the Egyptian ; that of the Syrians numbered 250 students ; of the Turks 60 ; of Bagdad 3 students etc. The proportions are the same as in the golden age of Arabian learning. (Kleinpaul.) (Baas).

The mosque el Azhar at Cairo was built by the vizier of the Fatimite caliph Moez-ledinillah in 972. In connection with it was established a school which speedily grew into a Mussulman university. (H.)

Abu Bekr ben el Bedr, (died 1290) an equerry by profession; and Muhammed ben Jakub el Cheili.

In the pharmacies, first introduced, as noticed above, by the Arabians (the first *public* pharmacy was erected by Al Mansur in the year 745), the students — those of medicine as well — learned pharmaceutical preparations and manipulations, according to the Arabian pharmacopœias and dispensatories (Krabadin, Grabadin), under the direction of teachers and masters. These works contained a list of the drugs to be kept in store, and directions for the preparation and preservation of medicines. The state, however, watched to see that the proper medicines were always kept plentifully on hand, and were not sold at too high a price — arrangements which, as we know, exist even to-day and with the very best results.

We will, therefore, in this place add the names of those authors, who rendered special service in the department of pharmaceutical science, whose practical work in pharmaceutics and the institutions subservient to that art has rendered them meritorious, and who have, therefore, without doubt, mediately or immediately, greatly advanced practical medicine also.

The most famous of these names is that of a certain Geber, concerning whose life and circumstances, in spite of his fame, reports differ very widely. Sometimes e. g. he passes for a native Greek, apostatized to Islamism, sometimes for an Arabian of Haran in Mesopotamia, whose proper name was Abu Musa Jafer el Sufi, and again even two different persons are included under the one name, viz: Jafer el Sadik and his pupil Jafer el Tarsufi (699–765).

Under his name are still extant some chemical treatises (one under the title "Alchemia"), in which are described the preparation of lapis infernalis, sublimate, burnt alum, milk of sulphur, artificial cinnabar etc. Unfortunately, however, he defends that idea which has caused so much mischief in the minds and life of many of mankind, viz. that by certain methods the baser metals may be converted into the nobler, and that the latter (since the baser ingredients of the metal have been removed) possess also the faculty of removing the uncleanness, that is the diseases, of the body. He also forwarded alchemistic delusions by the assumption that sulphur and mercury were the basis of all the metals. The theory of the transmutation of metals depended upon correct, but falsely interpreted, observations. "By expulsion of sulphur, galena — everything which possessed lustre was a metal — was changed into lead. From the lead by further treatment with fire we get (by reduction) a certain quantity of silver and from the silver we separate gold. Alchemy regarded these separations as productions, and the lead, silver and gold as products of its manipulations." "Gold by heating with sal ammoniac took on a red color. What was more natural then to the inexperienced mind than to believe that the properties of the metals dependded upon certain constituents, and that by the abstraction or addition of certain substances the properties of silver and gold might be attained? The imperfect tincture produced the color, a more perfect tincture might give the lacking qualities." (Liebig.) The first phase of chemistry too was chiefly synthetic, and it was not until the 17th century that this science entered upon the analytic method. In fact all the natural sciences (including medicine) in their early grades of development pursue chiefly the synthetic route. To-day the synthetic method, as we know, is revived in chemistry, but only on the basis of preceding analysis.

Among other authors of pharmaceutical treatises

Sabur ebn Sahel, (died 864), president of the school at Jondisabur, published the first "Grabadin"[1] in the middle of the 9th century;

Abul Solt Omaja (1068–1134) wrote "On Simple Medicines", a text-book of anatomy etc.;

The Christian physician

Amin ed Daula ebn el Talmid (1070–1164) left us an "Antidotarium";

Abu Jafer el Gafiki (died 1075) also wrote "On Simple Remedies";

Nedschib ed-din el Samarkandi (died 1222) composed an "Alphabetic Catalogue of Medicines", a treatise "On Cordials" etc., "On the Symptoms and Causes of Disease"; and

Ebn el Kotbi (about 1311), a physician of Bagdad, was the author of a treatise entitled "What the Physician should know".

In 1236 Cordova fell before Ferdinand III., the Saint (1139–1252), of Castile; in 1258 Bagdad succumbed to the Tartars, and with these two chief seats of Arabian science, that science itself was overthrown. Only the extermination of the industrious, high-bred, but over refined and effeminate, Moors of Spain (1492), practised under the veil of the doctrines of Christ, and by the "Most Catholic" Ferdinand the Catholic (1452–1516), was needed to remove the Arabian people entirely out of the rank of the nations advancing in civilization. It must be remembered too that the Arabians, even in the meridian of their power, planted by their wantonness the germ of their own decline and overthrow. As conquerors, through their luxury, immorality (harems, pæderasty) and intermixture with the subjugated peoples etc., they rather plundered than utilized the wealth upon which they seized. All these are, doubtless, vices which accompany the acme of scientific and artistic cultivation among other nations, and—the statement is as sad as true—occasion and accelerate its transfer to different hands.

Arabian medicine, entirely independent of its introduction into nosology of a few new and important diseases, rendered itself of essential service to general medicine in the following directions:

1. It cultivated the study of the Greeks and made them accessible to the West (though in a corrupted form), until, through the revival of learning, the Greek writers could be once more studied in the original. This transfer of Greek science, including medicine, to the West was accomplished through Italy and Spain, and even as early as the age of Charlemagne, though it became more marked in the following centuries. By it the

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[1] This work continued in general use among the Arabians until superseded by the "Antidotarium" of Amin ed-Daula ebn el-Talmid about 1125. (H.)

Arabians acquired very high importance in the intellectual development of the West. and particularly in its medical culture. Hence the popular scorn of the Arabians, manifested by those who proclaim only "new facts as acquisitions" in medicine, seems entirely out of place.

Indirectly Arabian civilization and culture was of further advantage in that it awakened, by its own too servile imitation, an opposition against its teachers, and even against itself.

2. It introduced a great number of new and active remedies from the vegetable kingdom, and especially from the department of chemistry (a science which it fairly created), and brought to life the pharmacies, as an advance in practice.

3. It contributed directly to the reform of practical medicine by the exhibition of chemical[1] remedies: indirectly by the union of the natural sciences with medicine, which (on the advice of Aristotle, indeed) had its origin with them.

4. It first entered upon the clinical method of instruction, though it reaped for itself very little advantage therefrom.

5. It preserved a lay medicine at a time when, as in the West, priests and monks only, in Christian ignorance, treated the sick with supernatural and superstitious remedies — a period which, without the Arabians, would have lasted at least longer than it actually did.

Such are the services which secure to the Arabians, for all time, an honorable position in the history of medical culture. The Arabians, however, did not fade from the ranks of the great cultured nations until, after a relatively short period of bloom, they became historically senescent, and when other and more powerful races (in conjunction with whom they had themselves labored in part) were able to assume the burden of further development, even in medicine. History teaches also the teleology of national life, and in this case, as with the Greeks and Romans, we are able to determine the existence of that law of development, in accordance with which nations, after attaining the meridian of their intellectual and social culture, decay physically and mentally — a law whose inexorability we may humanly deplore, but whose grandeur in sustaining the active course of history must fill us with astonishment. From the grounds of the past and fertilized by the good remains of decaying culture, new and fruitful races must be transplanted and cultivated. Ancient civilizations never pass away until the germs of the new are already planted so widely, and are become so vigorous, that they can continue to grow independently. So in early antiquity Egyptians and Assyro-Babylonians, at a later period Greeks and Romans, withdrew from the scene. After them came the Arabians, and when these had disappeared, new races began at once to assume their rôle. Lack of progress and activity in any people furnishes the cue for the development of power in another. Such is the law for the conservation of force, even in the life of the human race!

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[1] The Arabians were extremely well versed in chemistry and technology. They were acquainted e. g. with the use of powder and of artillery before the West. Even as early as the 11th century it is said of them that "The ship of the king of Tunis carried with it a number of iron tubes, from which was thrown much thundering fire" (Pedro de Leon's chronicle of Alfonso VI). They derived from China a knowledge of paper, and as early as 650 made silk paper for themselves in Samarcand, and cotton paper in Mecca in 706. The latter was introduced into Spain in the 12th century. (In Egypt papyrus was still employed in the beginning of the 9th century, although other paper was known. A piece two metres long and 80 centimetres broad cost about 68 cents.) At the same period, and about 500 years before the West, they also made woodcuts for the ornamentation of paper MS. (Linen or rag paper is not mentioned in the West before about 1400.) The Arabians also received from China the compass, which they improved and employed as early as the 12th century on sea voyages and journeys across the deserts. They are said too to have constructed the pendulum clock as early as about 1300.

EPIDEMICS OF THE BYZANTINE AND ARABIAN EPOCHS OF MEDICINE.

The medical culture of the Byzantine empire and of the Arabians, discussed in the preceding pages, has vanished, as such, from the stage of history. The same fate has likewise befallen a form of disease distinguished as "The Plague of the Ancients". The case, however, is different with respect to the epidemic diseases of the skin, first introduced into nosology by the Arabians, and which have impressed upon their medicine a stamp so definite that, independent of this connexion they could not be suitably treated historically. Here, therefore, is the most suitable place (in the completion of the picture of these two forms of civilization) to consider the epidemics and the new epidemic diseases, which either actually occurred within their period, or were first described by representatives of that period.

The Middle Ages was the period for the forcible remodelling of humanity in both a spiritual and corporeal view. In the latter direction the causes already partially considered in the preceding pages were active, and, in addition thereto, especially the numerous and frightfully murderous epidemics; so that, from a medical standpoint, we might name this period the age of epidemic diseases. The beginning and the end of this period were particularly ravaged by them. None can, therefore, wonder that the Middle Ages left to succeeding times only one-half the population which they had themselves received at their beginning!

One of the most frightful visitations, which, in the form of disease, have ever befallen mankind, bears in history the name of THE PLAGUE of JUSTINIAN, since it raged throughout almost the whole reign of that emperor (527–565). But it also continued beyond this period, prevailing nearly 70 complete years (from about 531 to about 600), touching in its devastating march the whole of the then known world, and not sparing even the most remote barbarians, the Persians and the Germans.

As is the case with all epidemics of ancient times, many forerunners and attendants of the Justinian plague are mentioned. Their connexion with these epidemics is, however, partially inexplicable (though the credulity of mankind knows readily how to explain it), e. g. that of comets, earthquakes, eclipses of the sun; in part they stand in reciprocal relations as cause or effect, like drought, famine etc. Thus there occurred before the plague of which we are speaking an earthquake, which in a few moments destroyed the greater part of the populous city of Antioch, and, from the resulting conflagration, laid the rest in ashes, so that 25,000 persons were buried in the ruins and the flames. Then comets of wonderful, and, to the superstitious, of frightful, form, appeared, and throughout a whole year there was a remarkable darkening of the sun, which is ascribed to the numerous volcanic outbreaks of the same period.

From the year 538, however, there raged for a year or more a general famine, which in Italy alone brought to a miserable end an innumerable host of men—among the Piceni alone 50,000 peasants perished. Marks of various, but always remarkable, colors, appeared likewise upon houses, stones, clothing and even food,—everything, and their significance was magnified by Christian superstition, then in the bloom of youth, into all that is frightful and terrible.

With such harbingers and attendants, and after a destructive conflagration which had reduced to ashes the great hospital in that city, there appeared in Constantinople in the year 531 a form of death (if I may use that expression), which was originally only local. The general plague, however, originated in the year 542 in lower Egypt. Thence it spread its devastation up the Nile and away from that stream into Asia Minor, at first confining itself to the coast, but gradually bearing into the interior of the continents similar devastation and equal misery. Constantinople was speedily attacked, and (according to the almost incredible accounts) in the time of its greatest severity 5,000-10,000 human beings perished there daily. In the next year, however, the plague striding over Greece to the West reached Italy. In 545 it extended into Gaul, and in 546 reached the Rhine, whose bordering cities (at that time in the bloom of prosperity), from Bingen over Mayence, the metropolis, to Schlettstadt, it depopulated with its ravages. After this first "period" of fifteen years (which it is said to have afterwards also uniformly maintained), the disease became milder, though it did not entirely disappear, until in 558 it visited Constantinople for the second time, with horrors only heightened by comparison with its first assault. So fiercely did it rage that the towers upon the walls were unroofed, filled to the brim with corpses, and then again covered in, since hands were wanting to assist in their burial, while many of those who lent aid in this horrible labor of heaping up the dead fell down themselves and expired in the midst of their task. Thus new causes of death in the form of the horrible gases of decomposition were stored up, as it were, in these fearful store-houses. In other cases the dead were treated more judiciously and hygienically by sinking the corpses in the open sea with the aid of a ship specially appointed for that purpose, though some bodies were carried by the waves back to the shore—dreadful tokens of warning to those who yet survived.

In this plague, however, the general imminence of death broke down all the barriers of custom and shame to such a degree that only the worst of mankind seem to have survived. In the year 565 this unprecedented plague visited Italy a second time so severely that the Romans could not advance against their enemies.

For long years this plague endured, intermixed at the close with the small-pox, sweeping away in its devastating course the bloom of manhood and youth, and destroying the greater part of women, maidens and children in all the then known world. It loosened too almost all the rootlets of the ancient civilization, so that the withered stem was able to maintain for centuries only a feeble and sickly existence.

No medical author has left us a description of the phenomena of this plague. The profane historians report upon it in the following words (vid. Hæser):

"Here, however, it began in the following manner. To many persons apparitions appeared under the form of some human being or another. Those, however, who met them were seized by the disease, while they believed that they had received a blow from the spectre. In the beginning many sought by prayers and expiatory offerings to prevent these horrors, but in vain; for even in the temples destruction overtook them. Others shut themselves up in their apartments, but then there appeared visions in a dream, or they heard a voice which called to them that they too belonged to the number of those devoted to death. Most persons were attacked without anything of the kind having happened to them, either awake or asleep. Some were seized with fever, others had none. The disease in some, after beginning in the head and occasioning redness of the eyes and swelling of the face, descended into the pharynx and carried off those whom it had seized. In others a diarrhœa existed; in others still buboes broke out, followed by a pernicious fever. Such patients, however, died on the 2d or 3d day. Some breathed their last in a state of unconsciousness. Anthrakes (phlyctænæ of the size of a lentil) also broke out and proved fatal to many."

The disease seldom visited the same individual a second time (if he was not killed by the first attack), though here and there exceptions occurred. Sometimes — in fact this was the rule — the disease appeared to be called forth by epidemic influences only; sometimes it seemed also a contagious affection, against which, however, certain persons possessed the most remarkable immunity, "so that they might almost wallow with the sick" without being attacked. Pregnant women were exposed to special dangers. If the buboes suppurated, recovery ordinarily followed. Certain parts of a city often remained perfectly exempt from the disease, and in the affected portions again certain houses were spared in a remarkable way, while others beside them were utterly depopulated.

The fact that buboes showed themselves clearly and generally for the first time in this epidemic proves that a transformation of the earlier form was taking place, by which the disease was converted into the more modern plague. From this period also the names "pestis inguinaria", "bubo-plague", which remain to us to-day, made their appearance for the first time.

About the same time that the bubo-plague, just described, was developed from the plague of the Ancients, and was winning for itself a place among the permanent epidemics, the same thing occurred also with regard to a series of other contagious diseases, to wit, the small-pox and the measles (scarlet fever?)[1]

Small-pox was most probably known at a very early period to the Indians and Chinese, as well as to the Greeks, only (it would seem as the result of that peculiarity of the medicine of the Ancients—the investigation of the individual disease, rather than forms of disease) it was not sufficiently described in accordance with its symptoms. The latter was first done in a tolerably satisfactory manner by the Arabian writers who report on the siege of Mecca by the Abyssinians, about the year 570. According to the latter, the small-pox seems to have been introduced among the Arabians by the Africans — small-pox is even to-day the special epidemic disease of the African race and the African continent. (The Koran also mentions the disease.) The same statement is true of the measles. At exactly the same period, however, and singularly in the West also, there was observed a new epidemic disease, distinguished as pustulæ, pusulæ (Marius of Avenches already calls it variola[2]), and described by the famous chronicler Gregory of Tours. The first medical description of the two diseases, however, was furnished in the 7th century by the Græco-Arabic author Ahrun. The first distinct division into two separate forms of disease is due to Rhazes, who described the schedrij (small-pox) and the hasbah (measles). This distinction was again obliterated, however, by the introduction of a form of disease styled humak (blacciæ = variola vel exanthemata iis similia).

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[1] Diphtheria was also mentioned at this period, and prevailed under the name "Equinancie" at St. Denys in 580.

[2] According to Curschmann the term "variola" originally included any disease of the skin accompanied by the formation of papules and pustules. The first physician who used the term specifically for small-pox appears to have been Constantinus Africanus of Salernum about 1075. (H.)

Moreover the Arabian physicians held these diseases as mere varieties of one and the same morbid process, the beginning of which they placed in fœtal life. They ascribed this process to general anomalies of nutrition acting during the fœtal period, and, therefore, also declared that every one, as a rule, must undergo these diseases. They pointed, indeed, to the fact that, during the period when the woman is "pregnant", the blood of the monthly "purification" does not flow (following in this the Grecian idea), as an evidence that the certainly impure materials of the menses were applied to the nutrition of the fœtus. Now these unclean humors must be again removed from the body; whence it results that every one is "disposed" (as we vaguely express ourselves to-day) to the above-named diseases, but is also attacked by them once only.

Of the symptoms of these diseases the so-called Arabian physicians had quite a satisfactory knowledge — they were acquainted even with eruptions in the internal organs — and in the treatment they followed more judicious principles than we see always pursued even at the present day!

Concerning the further course of small-pox and measles during the Middle Ages our knowledge is not very precise. This much, however, is certain, that these diseases — and the "holy fire" — from the sixth century onward spread more and more widely over Europe, and gained great diffusion particularly by the aid of the Crusades. After this — about the 12th and 13th centuries — they prevailed epidemically in England,[1] and even in Iceland (1241–42) and Greenland. Indeed these latter countries were so depopulated by them, that the civilization, which they possessed at that time in a high degree, perished almost entirely.[2]

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[1] Small-pox is said to have first appeared in England in 1241, and to have reached Germany via the Netherlands in 1493. The disease was conveyed from Europe to America at an early date, and appeared first in Mexico in 1527. Thence it spread gradually over the whole continent. According to Toner it prevailed among the Indians of New England as early as 1618, and its ravages were felt by the white settlers of this section in 1622 and 1638. (H.)

[2] It is worthy of remark that in the extreme north a notable medical culture prevailed during the Middle Ages. The most famous northern physician, surgeon and lithotomist, Rafn Sveinbjornsen (died 1289), according to the detailed account of Ludw. Faye of Christiania, was an Icelander. He had travelled extensively in France, Italy and Spain, and had also visited England, but died in Denmark. He practised the bimanual manipulation of Celsus in the diagnosis of vesical calculus. We should here make the general remark that in the three northern kingdoms civilization had attained a very respectable position, even during the early part of the Middle Ages. Icelanders in 877 discovered Greenland, and about A. D. 1000 also discovered the coasts of North America and practised barter with the natives. Even several centuries earlier the Northlanders, Norwegians and Swedes, carried on a lively trade in furs and amber with the Roman and Mohammedan inhabitants of the coasts of the Mediterranean as far as Byzantium. Indeed between the 7th and 13th centuries they were even hired as soldiers by the Byzantine emperors.

B. MEDICINE UNDER THE INFLUENCE OF CHRISTIANITY.

I. MEDICINE UNDER THE DIRECTION OF CATHOLIC IDEAS (THE MEDICINE OF FAITH).

1. CONDITION OF PROFANE SCIENCE AND PRACTICE IN THE STATES OF THE WEST DURING THE FIRST HALF OF THE MIDDLE AGES.

Of the relations of medical science, and the conditions of practice (so far as medicine was cultivated and practised by the laity) in the states which arose after the downfall of the Western Empire, we know very little. Medical works, particularly translations, were, indeed, in use, but we have only scanty evidence of the extent of this branch of literature, and the information which we can draw from other sources is also exceedingly meager. Hence it is that very little mention is made at this period of a lay medicine and of lay physicians — in contradistinction to clerical or monkish physicians; yet quite enough to establish at least the fact that such lay physicians were never entirely wanting, even among the Germanic and Frankish nations. They must have existed, though in a condition of deep degradation when compared with their earlier position. We might infer this too from the simple fact, that in the later days of the Western Empire, there were still very many educational institutions,[1] as well as numerous physicians of pagan, though inferior education, whose occupation could not have terminated at once, nor passed immediately into the hands of the monks. It may be readily imagined from the rank growth of

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[1] In the 4th and 5th centuries famous schools existed in the East at Constantinople, Berytus, Cæsarea, Alexandria, Laodicea, Pergamus, Antioch, Athens etc.; in the West at Rome (Athenæum), Ravenna, Marseilles, Autun, Bordeaux, Treves, Toulouse, Poitiers, Lyons, Narbonne, Arles, Vienne, Besançon etc. These schools were mostly under the direction of pagan teachers, and their curriculum comprised philosophy, medicine, law, literature, grammar and astrology. By the close of the 6th century most of these secular schools had disappeared, to be replaced by the monastic and cathedral schools. The earliest monastic school in the West seems to have been that of Nismes, founded by St. Castorius, bishop of Asst, A. D. 422. Others soon followed at Lerens, Luxeuil, Fontenelle, Sithier, St. Medard etc. Monasteries were first founded in England by St. Germain about 430, and a monastic school was established by him at Bangor-Iscoed in north Wales a few years later. Iltutus, one of St. Germain's companions, also established a school at Llanyltad, or St. Iltad's, in Glamorganshire, about the same period. Monastic schools were also founded at Iona (565), Lindisfarne (635), Oxford and Cambridge (about 670), Peterborough (670), Whitby (about 675), Jarrow (678) etc. In Ireland monasteries and monastic schools were introduced by St. Patrick about 440. Among the most famous monastic schools of Europe were those of Fulda, Hirschau, Corvey, Prüm, Weissenburg, St. Gall, Reichenau etc. (H.)

Christian (amalgamated with pagan) superstition, as it manifested itself even during the closing ages of Antiquity, and likewise from the Christian scorn for science[1] and the deficiencies of profane scientific efforts and impulses, that no great weight was any longer laid upon ordinary medicine, especially that descended from the Ancients. There still survived, however, from the closing days of Antiquity a higher class of schools in which medicine was taught, as e. g. at Marseilles, Lyons, Autun, Bordeaux, Toulouse, Narbonne, Arles in Gaul; at Treves on the borders of Germany; at Aventicum (Avenches) in Switzerland; at Rome, and subsequently at Ravenna. At these schools, which were attended not simply by youths desiring to obtain an education, but also by grown men, grammar, rhetoric, philosophy, jurisprudence and medicine were taught. The teachers were appointed by the cities and were exempt from the duty of quartering soldiers and other public burdens. Some of their salaries were very high. Thus Eumelus, a famous teacher at Autun (about 300), had a salary of $5500. (Schlosser.) Accordingly Goths and Franks, even when Rome had sunk to the position of a little city with not more than 500 inhabitants,[2] for the most part copied both the public and private regulations of the Romans. The two peoples were also connected in culture and traditions by family descent and family alliances. Hence many students went for their general education to Italy, or even to the capital of the Eastern Empire. We know too that some acquired at Constantinople medical skill and information, which they subsequently employed in their own homes, and that translations of the Greek authors (e. g. Hippocrates, Galen, Alexander of Tralles etc.) into Latin were made after the downfall of the empire.

Of the public and private position of physicians in those dark ages we know more than of the condition of science itself, and of its attributes.

Those persons to whom the legislatures of the Ripuarian and Salic Franks,[3] in the years 422 and 496, assigned the duties of state physicians, must certainly have been superior physicians of lay rank. Among these duties e. g. were the determination of virginity (certainly not done by the clergy, who could not, or at least should not confessedly, understand such a question!), arbitration in cases of bodily injury, poisoning etc. The history of juristic science also gives us here some light on the beginning of state medicine, as well as on the history of the medical profession — subjects upon which special information is lacking in medical works. Hence these legislative enactments are of considerable importance and value in the consideration of our present subject. Moreover there certainly existed hospitals under lay administration, e. g. at Lyons in 542,[1] and at Merida in 580.[2] Besides this there were also physicians-in-ordinary with the ancient title of "Archiater" (a title undoubtedly given at a later period to clerical physicians also), and therefore an official position (modelled after the Romans), definite functions and an honorable office for them. Indeed more of the Roman arrangements and institutions were handed down to the Middle Ages than we, as a rule, emphasize in our histories. Thus mention is made of a Byzantine physician Anthimus,[3] who was physician to Theodoric the Great about the close of the 5th century, and wrote for his master a Latin treatise on dietetics, which has been recently discovered;[4] of a certain Mareleif, "The first among the physicians of the royal court" of the Frankish king Chilperic (561–584); of the archiater Peter, "who sat joking with Protadius, majordomo, at the table in the tent of a later Frankish king named Theodoric" (605), and the archiater Reovalis (about 590), who related: "When he was a small boy and had a disease of his thigh, he was given up for lost. Then I, having made an incision into the testicles (hernial tumor?), as I had once seen done in the city of Constantinople, restored the boy sound to his sorrowing mother." This anecdote speaks in favor of the existence at this time of a higher class of lay physicians, possessed even of a certain knowledge of surgery and dexterity in that art, the practice of which was from the beginning forbidden to monkish physicians, and at a later period was still more strictly interdicted. The so-called Alemannic code, arranged between the years 613 and 628, argues in support of the same conclusion and upon similar grounds. This code says: "When the skull is perforated so that the brain comes into view, and the physician touches the brain with a feather or a probe." . . . "After their feet were cut off they walked with stilts"—an example of "artificial" limbs, such as are used even at the present day. Among the Alemanni also physicians were employed in medico-legal duties, as we should call them to-day, and they cannot have been very scarce, for in all the Germanic codes mention is made of the fee to be granted the physician in the determination of the penalty for bodily injuries. Hence we may safely assume that medical aid was everywhere employed. (S. Venedey, "Deutsche Geschichte"). That the physicians were not reckoned among "The learned" (a class which included only those who had been duly instructed in the monastic schools, whose curriculum did not admit the "illiberal" art of medicine[1] until a later period), is evident from the Langobard code, arranged in 650. This ordains: "Whosoever has inflicted wounds upon any one, he shall supply him with attendance and likewise pay the fee of the physician, at a rate to be estimated by learned men." This estimate, like the medical assizes of the present day, was not made by the physician himself, but by "The learned." It does not, however, follow from the above passage that the physicians of that day could not fix their own claims because they were considered unworthy of such a trust, nor because they did not enjoy sufficient confidence in their character. From the story of king Gram too, who, in order to remain unrecognized during a festival, put on the dress of a physician and took the lowest seat at the board, we cannot infer that the position of the physician was considered disreputable. On such occasions this seat was left vacant for casual travellers, and itinerant physicians often, probably, occupied it as guests, so that the disguise of such an individual was least calculated to awaken suspicion. That there were, even in the seventh century, lay-physicians, who had studied in the ancient style under another physician, is manifest from the public ordinances ("Fuero Judzgo"[2] — the

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[1] The Church at that period (and it does the same to-day!) held science in general as the seed of the devil!

[2] Rome, especially under the first emperors, had become, as we know, a magnificent city. It began to suffer in repair severely during its occupation by Alaric (410), and again under the Vandals (455), who plundered it particularly of its treasures in metal, though they still left more than 3000 statues in bronze. The city, however, suffered most severely at the hands of Totila (546). Thenceforth it remained impoverished and decaying, so that from the 8th century onward the most expensive marble fragments were burned for lime, and the remnants of masterpieces in architecture and sculpture were employed in the construction of ordinary walls. In this way much has been preserved to us. It was not until the 13th and 14th centuries that a beginning was made in the removal of the rubbish, which had become an unendurable nuisance.

[3] The Salic Franks were those living on the Moselle, the Maas and the Yssel. The Ripuarian, those on the banks of the Rhine. (H.)

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[1] The "Hôtel-Dieu" of Lyons was founded in 542 by Childebert I., king of Paris (511–558), and his queen Ultrogothe. (H.)

[2] Merida, the Augusta Emerita of the Romans, is situated on the Guadiana River in Spain. It was founded by Augustus B. C. 25 for the settlement of his veteran troops (*emeriti*), and subsequently became the capital of Lusitania. It fell into the hands of the Moors A. D. 713, and was finally attached to the kingdom of Castile in 1228. Many remains (circus, theater, baths etc.) of the Roman period still exist in this city. (H.)

[3] This is an example of a visit (probably merely temporary) by a Byzantine physician to the West. Together with the concordant fact that very early — even in the 7th century — Greek clergy came to England as teachers (even of medicine), it makes it seem probable that Byzantine physicians and savants may have visited the West more frequently than has been reported, and that a peaceful commerce and scientific relations prevailed between the East and the West. The instance of the royal veterinary physician Theomnestus is a proof that eastern veterinarians also existed in the West. (Baas.)

Theodorus of Tarsus was sent to Oswy, king of Northumberland, by the Pope A. D. 668, and rendered efficient service in the organization of the Church of England. He was Archbishop of Canterbury A. D. 668–693, and a warm friend of all the sciences. Theomnestus was the veterinary physician of Theodoric the Great, king of the Ostrogoths, and accompanied the army of the latter into Italy in 488. Some fragments of his writings are preserved in the "Hippiatrica". (H.)

[4] Anthimus emphasized the fact that a judicious diet was the fundamental condition of health. He directs bread, meat, bacon, mead, beer, spiced wine, the inner parts of animals (the uterus was a delicacy among the Ancients!), birds, eggs, fish, oysters and muscles, roots and vegetables, legumes and various sorts of flour, milk (fresh and warm in phthisis), butter, cheese, fruit etc. (J. Uffelmann.)

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1. The "Liberal Arts" included grammar, rhetoric and logic (the trivium), and arithmetic, music, geometry and astronomy (the quadrivium). (H.)

2. The "Fuero Judzgo" is properly a Spanish translation of the original code of the Visigoths entitled "Forum judicium". This translation was made by order of Ferdinand III. in 1241, and formed the basis of Spanish mediæval law. (H.)

title of the Fueros of the Basques) of Chindaswind (641–652) and Receswind (652–672), kings of the Visigoths.[1]

Such lay physicians were, accordingly, regarded as mechanics and tradesmen, and as inferior in birth to the learned. It does not follow, however, from the ordinances hereafter cited, that these physicians of the Visigoths were necessarily regarded with especial disrespect. These ordinances, like all similar laws from the beginning of time to the present day, were instituted chiefly to provide against transgressions and to meet exceptional cases, and may best be compared with our Draconian vaccination statutes of the present day. That physicians were then made responsible for their want of skill is too, in itself, a regulation in no respect disgraceful to their profession—otherwise the same thing would hold true to-day. The furnishing of security was a precautionary regulation, which sprung probably simply and naturally from the fact that the lay physicians of that period, who were not settled in fixed residences, could in no other way be made responsible for the conscientious treatment of their patients, nor constrained to complete their cure. That they were compelled, however, to stipulate their fee in advance certainly points to a low and purely juristic conception of the medical profession and its functions; and yet it is quite similar to the conception which prevails in the eye of the law in the German Empire to-day. Nor can it be regarded as offensive except to a more refined idea of the profession, an idea foreign to the legislators of that day as well as to those of the present, while the perception of its offensiveness cannot be presupposed in the public of the Middle Ages.

These ordinances, which, accordingly, we need not understand exclusively as a portion of the penal code, but which, in consequence of the protective clauses therein contained, we may better regard as a kind of medical assize and ordinance (doubtless very imperfect, yet partially agreeing with even the "Most modern standpoint"), run as follows:

1. "No physician may undertake to bleed a woman in the absence of her relatives: if he has done so, he shall pay 10 solidi [2] to the relatives or to the husband, since it is not impossible that occasionally some sport may be associated with such an opportunity." In all Germanic legal codes (Salic, Ripuarian, Bavarian) carnal offences were very severely punished. Perhaps this was an expression of the high respect of the race for women (a sentiment, as we know, of great strength among the Germans); perhaps (and more probably) it was designed to remove or overcome the sexual rudeness of a lack of civilization or laxity of morals. "Whoever touched the hand, arm, or breast of a maiden was fined 15, 30, 35 solidi. The servant who became too intimate with the maid of another, if she died of the natural results, was

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[1] How greatly many ideas had changed under the influence of Christianity immediately after the downfall of the Western Empire is shown, among other evidences, by the fact that in the laws of the Visigoths artificial abortion, effected by a physician (a crime, as we know, at least tolerated by the Romans), was punished by loss of sight.

[2] Such a solidus was in value about $2.25, while two solidi was the price of an ox. Hence the value of money was at that time at least thirty, and probably sixty times as great as it is to-day, and this fine for a private venesection is very high.

castrated." Hence it follows that this unchristian operation was still in vogue and was performed by way of punishment. It was likewise done from motives of revenge, as the case of Abelard (who was castrated by the friends of Heloise in consequence of his love for her) proves. The same vengeance too is commonly taken at the present day among the southern Sclaves, Arabs, Abyssinians, Negroes, Turcos, Indians etc.

2. "No physician shall visit any person confined in prison without the presence of the jailer, lest the prisoner, through fear of his punishment, may seek the means of death at his hands."

3. "When any one has called a physician to see a sick person, or to heal a wound, the physician, when he has seen the wound or recognized the pains, shall at once take charge of the patient under definite security." [1]

4. "When a physician has assumed charge of a patient under security, he must cure him. If death ensues, he shall not demand the stipulated fee, nor shall a suit be instituted for it by either party." [2]

5. "If a physician has removed a cataract[3] from the eye and restored the patient to his former health, he shall receive a fee of five solidi."

6. "If a physician injures a nobleman in bleeding him, he shall pay 150 solidi. If, however, the patient dies, the physician (how equitable!) shall be delivered up at once to his relatives, to be dealt with as they may see fit.[4] When, however, the physician has killed or injured a slave, he must return a slave of the same kind." [5]

7. "When a physician has accepted a student, he shall receive a fee of twelve solidi."

8. "No one shall cast a physician into prison without a hearing, except in case of murder."

From this last ordinance it is manifest that the lay physician and surgeon, even in these barbarous times, was still considered worthy of a certain respect; otherwise he would not have been expressly protected from an arrest, which was both allowed and approved in the case of other less respectable and less respected persons.

It should be noticed too that there was a distinction made between a call to visit the sick and to treat a wound.[6]

The high remuneration (see ordinance 5) and the high penalties may, however, indicate a relatively good social position in the lay physicians of that day, although they might all be considered members of the so-called lower class. In fact such was the estimation of even the best surgeons down almost to the 19th century.

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[1] Latin "statim sub certo placito cautione emissa infirmum suscipiet."

[2] Latin "nec ulla inde utrique parti calumnia moveatur". (H.)

[3] Latin "ypocisma". (H.)

[4] The physicians, however, in doubtful cases guarded themselves against these and similar ordinances by having the patients declared dead in proper legal form, and in advance of treatment, so that if death actually ensued it could not be ascribed to their treatment at all events.

[5] Nicholas and Donatus, physicians of Austrigilde, wife of Gontram, king of Burgundy (561–593), were so unfortunate as to lose their royal patroness by smallpox (581), and in compliance with her dying injunction were slain upon her tomb by her faithful spouse. (H.)

[6] If we consider the comparative condition of medicine in those days, the demands made upon the practice of such mediæval lay physicians will seem by no means trifling. This is evident from the fact that in Sweden (laws of Sudermania, compiled in 1327) the lawful physician was expected to understand the treatment of fractures, incised wounds, wounds of the skin, stabs through the body and finally even that of amputated limbs.

In addition to the monkish practitioners, there also existed in the first half of the Middle Ages many Jewish physicians, who had been educated at Alexandria, or still later in the so-called Arabian schools, and Arabians themselves officiated in the West as lay physicians of the higher order.

The ordinary physicians of princes, and even of the popes, at that time were often Jews, who had been educated in the schools of the East and were scientific physicians. They held these positions in spite of the fact that, since the days of Theodosius II. (as well as under the earlier emperors), Christian fanaticism had excluded them by law from all state and municipal offices, because they had crucified the Saviour. The consultation of Jewish physicians was also prohibited by the Church on many occasions. Yet in the eleventh century Jews were almost the only authorized lay physicians of the higher order. Whether they were compelled to wear a yellow mark (Judenfleck) upon their clothing, like the other Jews of the Middle Ages, is not stated, but is quite probable. It would certainly agree with the "spirit" of mediæval fanaticism.

Even during the first half of the Middle Ages monkish or clerical medicine had almost entirely overgrown all higher lay practice, and herniotomists, lithotomists, oculists etc., uninterrupted successors of the lower itinerant medical profession of the Ancients, alone survived. Such physicians or rather empirics, were probably the men who practised the few reported cases of Cæsarean section upon dead mothers in the earlier portion of the Middle Ages. The lives of a subsequent bishop of Constance and an abbot of St. Gall e. g. were saved by such physicians in the 10th century. These so-called "Volksärzte" of the Germans, accordingly, are to be considered the uninterrupted successors of the lower itinerant physicians of the Greeks and Romans. These alone survived, while the higher class of lay physicians, who still existed among the Goths in the beginning of the Middle Ages, disappeared, or at least took a position far in the background, until, by the foundation of the school of Salerno and the European universities, they came once more into prominence.

In the Niebelungenlied, a poem which in its present form dates from the 12th century (the minnesinger Kürenberger, about 1140, is said to have arranged it), though its substance concerns a still more remote German antiquity,[1] physicians (though none of the clerical profession) are found, although in other passages, often in close proximity to medical procedures, priests are spoken of. Thus in the battle with the Saxons it is said:

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[1] The use of the magic cap (Tarnkappe), which rendered one invisible, and therefore invulnerable, may be regarded as a theurgic measure. The same may be said of Siegfried's baptism in dragon's blood, by which he became vulnerable only in a place about the size of a leaf between the shoulders, as Achilles was only in the heel. In "Indrun" (manifestly in imitation of the Iliad) we first find the "Heilkunst Meister" Wate employing roots, salves and powerful herbs in the cure of wounds. He had learned his art from a rude old woman (druidess?).

> "To those who physic knew was offered rich reward,
> Silver unweighed, and with it too the shining gold (to-day nickel!),
> To heal the heroes when the battle's rage was o'er."

Beside this intimation of surgical aid stands the simple domestic treatment of the loud-wailing Chriemhilde, after the murder of Siegfried:

> "The faithful spouse so writhed in pain and inward woe,
> That she was often freely sprinkled from the spring."

Although by means of this certainly simple therapy

> "It was great wonder she recovered from her grief",

she was yet able at once, and in person, to open the medico-legal investigation for the murderer: for

> "Denying they persist. Then spake Chriemhilde thus:
> Let him who guiltless stands approve the fact to me
> By going to the bier before the people all,
> Whereby we may at once the honest truth perceive."
>
> ' This is a wonder great, yet often is it seen,
> When one with murder stained hard by the dead appears,
> The wounds do bleed afresh. So happened it too now;
> And from this very sign was Hagan's guilt disclosed!"

a superstition long prevalent, and which even found a place in much later medico-legal works of all seriousness.

On the manner of transporting the wounded[1] and their care (according to Fröhlich, even wounded enemies were carefully nursed), we find also a few notices. Besides other hostages, there are brought:

> "Of wounded to the death, know thou our princess high,
> Full eighty stretchers red with blood are in our land.
> He begged for the sore wounded all the best of care,
> Rest suited for their wounds he sought, and gentle heed."

This was much more than is customary among other uncultivated people, who, as a rule, abandon their own wounded to their fate.

In the earliest ages too women *only* seem to have practised medicine among the Germans and Celts, as they do to-day e. g. in southern Russia. Probably, as in the latter country, medicine was regarded as unworthy of the attention of men. At least in old-German writings (as well as in those of Tacitus) medical women alone are mentioned, and it is not until the 12th century that physicians are also spoken of. Their remedies, as is the case with all uncultivated nations, consisted chiefly of charms, runic characters, and the natural domestic remedies. St. Hildegarde too was acquainted with no other remedies than the aboriginal, domestic drugs of the Germans and their methods of preparation. It was not until the 12th century that old-Greek medicine and Arabian remedies reached Germany. (Among the ancient Germans Eir was the goddess of physicians.)

[1] The Norwegian king, Magnus the Good (1042–1047), after a battle, selected for the handling of the wounded twelve of his warriors who had the softest hands. (H.)

2. CHRISTIAN MEDICINE WITH A PRACTICAL TENDENCY. (NURSING, MONKISH PHYSICIANS). MONTE CASSINO, SALERNO, MONTPELLIER.

Religion and medicine, in the early ages of civilization, are ever closely connected as the effect of one and the same impulse — the impulse of self-preservation. The former serves for the period after death ; the latter, for the present world. The Middle Ages, however, were, as we have seen, in many respects an epoch in which civilization arose anew.

Through Christianity, which during this latter period became widely diffused, the original union of religion and medicine was once more revived, to endure for a long period. More especially was this true from the third century after Christ. This reunion was begun by even Christ himself, who, like almost all founders of religion, found it necessary to establish his claims as an embassador of God by the performance of theurgic cures. It resulted more especially from his inculcation of an active charity, which placed the oppressed, the poor, and the hitherto despised and forsaken, prominent in the foreground of life. Marvellous ! This most effective, socialistic doctrine of the son of the most egotistic people known to history, planted, in an age which appeared hostile and inaccessible to all culture, the germ of that humanity, which subsequently developed into a vigorous and fruitful plant — a humanity of which intimations only existed among the Ancients, and to the maturing of which the Germanic peoples were called ! Thus Christianity preserved and displayed in practical, daily life its lofty power and its mission, almost in spite of those who, in nearly every other direction, corrupted into a curse the sublime germ of the doctrine of Christ, and by avarice and abuse prostituted to their own ends even compassion itself ; while, through the overgrown superstition of its "ministers", it occupied a position hostile to science and to reason. While monks[1] and priests in general — of course there were exceptions — servants, though unwittingly, of that development which bade the rejection of the ancient civilization, destroyed, or at least scorned, the science of the Ancients, they yet called into existence institutions and works of beneficence, which at a later period supplied, at least partially, opportunity and occasion for the restoration of that science and for the foundation of a new science of medicine.

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[1] Too much stress, as a rule, has been laid upon the cultivation of the sciences by the monks, while, on the other hand, their activity in the arts, architecture, sculpture, the art of the goldsmith, wood-carving, writing, the illumination of manuscripts etc., has not received deserved attention. That the monastic scribes for the most part were ignorant of what they wrote, is well known. With them it was a mere question of caligraphy, miniature painting etc., i. e. a matter of pure manual dexterity. Indeed throughout the whole Middle Ages writing (like printing at a later period) was regarded as an art, so rare was a knowledge of it. An eminent scribe at that period was a man much sought after, very much like the scribes of the Orient to-day, and the distinguished Thoraschreiber among the Jews. Many of the monks devoted their whole lives to the completion of a single manuscript, a fact which serves to explain the smallness of mediæval libraries, most of which consisted of a few works only. These caligraphists were connected with medicine also by their preparation of medical MSS., some of which were illustrated in miniature in the style, and after the example of the Alexandrians and Byzantines. Their concluding words, found quite regularly at the end of the MS., are often characteristic of the men : e. g. "O God ! of thy goodness bestow upon me caps and hats, cloaks and coats, she-goats and a he-goat, sheep and cattle, and a handsome wife without children !" Ah, how joyous was I when I said : "Deo gratias" etc.

In point of time (though the idea itself is characteristic of the Middle Ages only), the origin of Christian benefaction reaches back to the very foundation of Christianity. Its followers were necessarily, indeed, the benefactors and the guardians of their needy brethren, and especially of the sick. For this Christ himself had set the example.

Almost from the first the church officials, deacons, subdeacons and deaconesses, constituted a regular body for the care of the Christian distressed and the sick. Afterwards the widows (though the latter were not required always to be widows in the genuine sense of that term) performed the same duties All these officials however speedily degenerated and fell into the worst vices, particularly the deacons, who even contracted "carnal" diseases in the course of their pious duties. But as soon as special institutions for the care of the needy were founded, there arose also a special class of nurses, who were expected to search out and convey to these institutions those who were sick, just as the monks of St. Bernard seek out and collect their beneficiaries to-day. These "Parabolani",[1] as they were called, soon degenerated too, and, forming a kind of body-guard for quarrelsome and factious bishops, allowed themselves to be precipitated into revolutionary acts. Hence both their number and their duties were soon curtailed. Besides these ordinary professional nurses (male and female), there were also pious souls, who, in order to secure salvation (the desire for which, then as now, lay at the foundation of many deeds of Christian charity), voluntarily devoted themselves to the care of the sick.

Some of these volunteers, in order to be truly acceptable to God, occasionally caressed, and (regardless of bacteria) even kissed the unwashed feet of filthy beggars. Such follies were a special source of delight to delicate ladies—and male blockheads, some of whom by such services fairly won the title of saints. Monachism proper did not make its appearance in the East before A. D. 300, and it reached the West still later. That, after its establishment, monks and nuns were active in caring for the sick was a matter of course; nor is it very surprising that physicians, in the proper sense of that term, were not placed at the head of most of these Christian institutions. Their duties too fell to the clergy, who possessed at most a rude sort of medical art handed down from the Ancients, or a pastoral medicine—a branch of medical science taught in our seminaries even to-day, and doubtless modelled after that of the monks. Yet there was a few of the clergy also (especially among the Benedictines), who studied the ancient physicians, and who were representatives of a practice worthy, in some degree, of being called medical. At a later period, especially after the Crusades, special orders of nurses developed, such as the Brothers of St. Anthony, the Alexians, the Beguins and Beghards, the Black Sisters, the Lollhards, Cellites, Lazarists, "Kalandsbrüder", the Hospitallers (Sisters of St. Elizabeth, Brothers of the Holy Spirit, Sisters of St. Catharine and of Christian Love, of Our Blessed Lady, Knights of the Cross etc.), the Sisters and Brothers of Charity, the Knights of St. John, Ladies of St. John, the German Order etc. A number of these orders are still active, and in some small degree really beneficent.

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[1] Probably so called in consequence of the hazardous duties (*παράβολον ἔργον*) which they were expected to perform. Gibbon says the Parabolani of Alexandria were first instituted during the plague of Gallienus (A. D. 253–268), but they are first mentioned officially A. D. 415. (H.)

Originally there existed no separate institutions for the exercise of Christian aidance, but it was carried on in private dwellings, as is done by a few physicians at the present day. In process of time, however, there arose separate houses of entertainment for the poor, for orphans, travelers etc., connected usually with the churches, the residences of the bishops or the monasteries, and these, in addition to the persons mentioned above, received also the sick. Such was particularly the case with the monasteries of the Benedictines. Among these Xenodochia belonged the Hospices, some of which are in existence to-day, as e. g. those of Mt. Cenis (founded 825), and the Great St. Bernard (founded 980). In the same class also should be reckoned certain magnificent foundations in the East, as that of Constantine II. (337–361) in Constantinople, that of St. Basil (370) at Cæsarea, those erected by Justinian and by Alexius I. (1081–1118, an orphan asylum). Here, too, must be mentioned the "Seelbäder",[1] where the baths in general use since the time of the Ancients were given gratis to the sick and the poor, and where the "Seelschwestern", in addition to the "Bader", furnished aid to the beneficiaries. Subsequently, however, this aid on the part of the sisters was by no means always limited to the higher offices of charity. Indeed so little was this the case that certain secret diseases, the result of unbridled sexual indulgence, occasioned finally the closure of these institutions. For the majority of monks and nuns in the Middle Ages were very corrupt in their sexual conduct, since the spiritual castration of their vows could at last only increase the physical impulse of sexuality. The so-called "Houses of Mercy" (Elendshauser) likewise belong in the class of which we are speaking. Besides such institutions there also existed at a very early period special hospitals (nosocomia),[2] whose sole object was the reception and treatment of the sick. Among these, those of the Nestorians were, as we have seen, the most important. The golden age of such establishments, however, began after the Crusades, by which the leprosy in particular was very widely distributed throughout the West, and we find them thenceforward in every land. Many of them bore the title of "Hospital of the Holy Spirit" (Gutleuthäuser, Siechenhäuser). Here and there they stood under lay administration down to the 13th century, at which period they were first withdrawn from such management, and a number of these hospitals still exist under the same names to-day. The "leper-hospitals", so numerous in the Middle Ages (in the 13th century there were about 19000 of them!), belong to the same class.

All these institutions were under the direction of the Church, and their corps of assistants was composed of the clergy, especially members of the religious orders, to whom their erection, like benefaction in general, was a tolerably easy matter, since the faithful furnished the means, by which they frequently cared for themselves first — and then for others. In a few cases only were regular physicians employed. Thus in the course of the Middle Ages — from the sixth century onward — everything which could be called medicine in the Christian West fell by degrees into the hands of the ministers of the Church, especially the monks, who looked upon themselves as great scholars, and were entitled to higher pretensions if they could read, an art which — even reading at that time was regarded as an "art"—had been quite lost by the laity in the first half of the Middle Ages.

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[1] These were free bathing establishments for the poor, instituted by the wealthy or their heirs in behalf of the souls of their founders. They were quite numerous in Europe during the Middle Ages. (H.)

[2] The statutes of the Hospital of St. John of Jerusalem, which took their origin in 1181, provided that four physicians (fisicien, mire, miège) should always be employed upon a salary, and that these should be skilled in uroscopy etc. The patients were to receive fresh pork, mutton or poultry, thrice a week etc. Surgeons (serorgien) were also appointed. The manumission of the slaves, which resulted from the introduction of Christianity, necessitated the establishment of these Nosocomia and similar institutions, since the slaves did not of course at once acquire material independence, but depended upon charity. Christian beneficence towards the poor too was not simply a matter of ethics, but dependent also upon the necessities of the new social relations.

What was, in the main, the nature of the so-called medical practice of the higher and lower orders of priests, who, though destitute of any special knowledge of medicine, disported themselves as, and even received the title of, "physicians" in the Middle Ages (many monasteries had entire divisions for their "Medici"), may be sufficiently determined from the fact that prayer, the imposition of hands, exorcisms, rings and amulets engraved with sacred symbols, holy oil, bones, rags and similar relics, conjurations, crossings, consecrated herbs, consecrated salt, special saints for wounds, toothache, poisoning,[1] and the three or four most sacred names etc., were employed generally and openly for the cure of every-day diseases by the clergy in their simple faith and gross superstition, as the same thing is done to-day in secret. Indeed at that time diseases were generally regarded as a chastisement from God, or a visitation of the devil—as in fact they are to-day in the eyes of many of the "faithful". Severe acute diseases were generally held to be the result of poison; pestilences, the effect of poisoning of the springs (charged especially upon the Jews) etc. The monks frequently held the principle of similia similibus, and e. g. treated the poisoning occasioned by swallowing a toad by directing the eating of another toad etc. (Not only Hippocrates and Paracelsus, but the monks too, were predecessors of the Homœopathists and Isopathists!) Besides the misuse of the numerous saints, other and grosser abuses, such as gluttony, extortion, lasciviousness etc., seem to have prevailed among the monks, so that finally their actions appeared too wicked and disgraceful even in the eyes of the indulgent Church. Accordingly, the practice, and in fact the study and teaching, of medicine, were forbidden to the higher clergy by the Councils of Rheims 1131, the Lateran 1139, Montpellier 1162, Tours 1163, Paris 1212, and the second Lateran 1215. Finally the lower monks were also restricted, and especially by the Council of Le Mans 1247 all burning and cutting (surgery) were forbidden them, on the principle "The Church shuns bloodshed"—a maxim which was not followed even in surgery, to say nothing of questions of faith! Long after this prohibition, however, the practice of surgery was still carried on by the monks; in fact we observe it even to-day in less enlightened countries, and among the specially faithful with us!

Of the large number of clergy who practised medicine at this period, and who, though of little merit in medical matters, were yet very worthy medicasters in other branches, the following are known at least by name. Though chiefly active in the science of pharmacology, they are of historical importance as a bond of union between the medical culture of Antiquity and that of the Middle Ages.

Paulus, bishop of Merida (530–560), is said to have performed the first Cæsarean section upon a living female, so that this honor is due to a bishop, and not to a swine-gelder; Theodorus (died 690), a Greek of Tarsus, bishop of Cambridge,[1] and a teacher of medicine, who forbade venesection during the increase of the moon; Cuthbert, of the same country; Tobias, bishop of Ross in England; Ursus, physician of pope Nicholas I.; Sigoald, bishop of Spoleto; Hugo, abbot of St. Denis; Campo, a monk of the monastery of Tarfa in Italy; Dido, abbot of Sens and physician to St. Louis; John of Ravenna, abbot of Dijon; Milo, archbishop of Beneventum; Benedictus Crispus (died 725), archbishop of Milan; Dominico, abbot of Pescara: Wigbert, bishop of Hildesheim (880); the more important personages, venerable Bede[2] (673–735), as a specimen of whose medical knowledge we may quote the following prescription: in June, of a morning, one may drink, fasting, a cup of cold water; the same in July; but in October, for sweetening the blood, for the expulsion of stone, and for healing the lungs, instead of water, one should take the milk of goats or of sheep, and should not wash very often; in February one should foment the limbs; in August he should not refresh himself in cold water, but in January he should plunge his body into warm water etc.; then Isidore of Seville (died 636), who, in his book "De natura rerum, sive de mundo", treats of medicine among other things; Rhabanus Maurus[3] of Mayence, bishop of Fulda, and finally archbishop of Mayence (774–856), who, in his work on "Physic", which begins with God and ends with the stone, discusses man and his parts, medicine and diseases; Walafrid Strabo (807–848), abbot of the monastery of Reichenau, founded by Charles Martel in 714 on lake Constance, and author of the first Latin poem composed by a German, a "Hortulus" in hexameter verse (a similar Latin poem, entitled "De virtutibus herbarum", which goes under the name of Macer Floridus, and maintained great influence[4] for a long period during the Middle Ages, is ascribed to Odo von Meudon, who died in 1161); Marbodus, who wrote on precious stones and died bishop of Rennes in 1123; Notker (9th century) of St. Gall, famous as the greatest savant of his age, a musician, astronomer, mathematician, poet and theologian, well versed in the Greek and Latin languages (at that time a great rarity), and well known also for his cures and his Uroscopy; Thiedegg of Prague, physician of Boleslaw, king of Bohemia (died 1017); and finally the famous abbess Hildegarde, of the convent of Ruppertsberg, near Bingen, eminent in her day as a physician and naturalist, who has left us a "Physica" or Materia Medica, (recommending, among many other popular German remedies, herring for the cure of the itch, fern against the wiles of the devil, gnat's ashes for eruptions, watermint for asthma etc.), and is said (therewith?) to have performed many miraculous cures. "It is worthy of remark that Hildegarde, with rare independence, was the first in the West to separate entirely her pictures of disease from her methods of treatment, relegating them to two different sections of her work. This was due partly to the plan of her writings, and partly, probably, to the fact that she avowedly adopted from the popular practice many stereotyped and detailed prescriptions without any change, while she was compelled to discuss and explain the prevalent views regarding the phenomena of disease in accordance with her theory. The remedies employed were (in addition to the common aromatics) entirely of German origin. Their mode of preparation was far different from the methods of the old Greek physicians, which had at this period been revived in southern Europe. Her enveloping the remedy in flour, which was then made into pancakes and eaten, is quite peculiar to St. Hildegarde, and takes the place of the sugar, syrups etc. now introduced among us from the South." (Jessen.)

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[1] The latter was a very frequent crime during the devout Middle Ages, and was even practised by means of the poisoned Host.

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[1] Theodorus of Tarsus was not bishop of Cambridge, but archbishop of Canterbury, and Primate of all England. He was sent to England by pope Vitalian in 669, and, in conjunction with his companion Hadrian, an African abbot, established schools at Oxford, Canterbury, and many other places. In these schools the Greek and Latin languages, arithmetic, astronomy, and the rules of versification were taught, and it is written of their pupils that many of them were as familiar with Greek and Latin as with their own mother tongue. The practice of chanting the service was first introduced by Theodorus into the English Church. Cuthbert was a famous abbot of Melrose, and subsequently (A. D. 684) bishop of Lindisfarne, while Tobias was the ninth bishop of Rochester, appointed to that see in 693. (H.)

[2] Bede mentions a Saxon leech Cynifrid or Cyneferth, who opened a tumor (abscess?) for the queen and abbess Ætheldryth, in 679. The Saxon "leech-books" also mention the leeches Bald, Cild, Oxa and Dun. That the surgery of these leeches was not confined entirely to the use of salves, poultices, plasters etc., is evident from the following extract: "For hair-lip, pound mastic very small, add the white of an egg, and mingle as thou dost vermilion: cut with a knife the false edges of the lip, sew fast with silk, then smear without and within with the salve, ere the silk rot. If it draw together, arrange it with the hand. Anoint again soon." (H.)

[3] The first German popular author on medicine and the natural sciences. He is also worthy of notice for his efforts to have sermons delivered in German, an object not effected until the time of Luther. Even medical lectures (those of Paracelsus and Thomasius excepted) were delivered in Latin in almost all the universities down to the present century. Maurus was a pupil of Alcuin, and active in the effort to introduce the Greek language into the West.

[4] Felt especially in the popular materia medica of the Germans, since, towards the close of the Middle Ages, and even in the beginning of modern times, the poem was translated into German (and also into Danish).

Within the religious order of the Benedictines, to which many of the persons just mentioned belonged, medicine enjoyed a regular and constant cultivation, and, under their hands (in contrast with those of the rude clerical empirics), it even preserved in some degree the appearance of a science. Aurelius Cassiodorus (480–573), the famous private secretary of Theodoric the Great (reigned 493–526), on entering this order founded by St. Benedict of Nursia (480–544), recommended to his associates the study of medicine. The statutes of the order indeed made the cultivation of the science a part of its rule, but the cure of diseases by prayer and conjuration[1] was alone permitted, and the study of medicine was prohibited. However Cassiodorus recommended the reading of certain of the writings of Hippocrates translated into Latin, of similar translations of Galen and Dioscorides, of the works of Cælius Aurelianus, of an anonymous author and several other writings, which constituted his own inherited library — a recommendation which bore fruit in the preservation of the remembrance of the ancient physicians. From the Benedictines of England,[2] where, as

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1. The use of exorcisms in disease was general until as late as the last century, and even now is frequently practised by the clergy.
2. England, unlike Germany, was, as we know, a Roman province, and thus came early and remained long under the influence of the civilization of the Ancients. She sent into Germany the first teachers of agriculture in the form of missionaries (Columba, about 600, for Bavaria; Gallus, for Switzerland; Winifred, for the Franks), so that the first impulse to the higher civilization of Germany proceeded from her borders, and in this roundabout way the ancient civilization began, though not till a late period, to influence our native country.

early as the 7th century, there were teachers of the Greek language, proceeded too Albin Alcuin[1] (736–804), the preceptor of mediæval Germany. It was he who prompted the foundation of cathedral schools by Charlemagne[2] (742–814), in which (as in the schools of the Egyptian temples and Arabian mosques) from the year 806 forward medicine was expected to be taught. Indeed, it is said that medical instruction was begun here in childhood, as in the schools of the Asclepiadæ. These institutions of Charlemagne, who, as we know, was a patron of classical studies and chose the economy of the Roman empire and the Christian papacy as the basis of his new political system, were important not only in the development of general education, but also especially in the cultivation of medicine, though their influence upon the latter science was not everywhere asserted and manifested in the same way as it was e. g. in the monastery of Monte Cassino and the school of Salerno. Such schools existed at Paris, Fulda, Paderborn, Würzburg, Hirschau, Reichenau, Metz, Osnabrück, Lyons, Cremona, Pavia, Florence etc. The Othos also in the 10th century took an interest in educational matters, while, with the help of their Italian and Byzantine consorts, they introduced (what Charlemagne essayed in vain) more refined culture and manners into their court, and favored luxury and art. In this way they became prominent in the development of civilization in Germany.

The curriculum of these cathedral schools embraced originally the Trivium, (arithmetic, grammar, music), and the Quadrivium (dialectics, rhetoric, geometry, astronomy). Charlemagne, in the Capitulary of Thionville (805), ordained, however, that medicine also should be taught (as already stated) under the name of Physic. How far the Arabian schools (and the Roman higher schools) served as patterns and a stimulus in this matter, it is not easy to determine. That both exercised some influence, seems probable, when we remember that Charlemagne had dealings with the Arabians, and frequently built upon Roman foundations. In the monastic gardens medical herbs, such as althæa, water-mint, squill, savine etc. were always to be planted. In the monastic garden of St. Gall[3] e. g. in the year 820 the following herbs were cultivated: lilium, rosa, salvia, sisymbrium, ruta, cuminum, gladiola, luhestico, pulegium etc. Still more! This monastery possessed a chamber for very sick persons, a pharmacy, and a house for the physicians, with a residence for the regular physician of the monastery.

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1. Flaccus Albinus Alcuinus, a native of York, England, and educated in the famous school of that city, over which he subsequently presided. He was one of the most learned men of his age, and was invited by Charlemagne to his court in 783 and invested with authority to establish schools throughout his kingdom. The "Schola Palatii", the pupils of which were the sons of Charlemagne and other young noblemen of his kingdom, was presided over by Alcuin for several years, until he finally retired to the monastery of St. Martin of Tours. (H)
2. The physicians of Charlemagne were Wintarus, and a Jew, Abul Faradsch. The latter must not be confounded with the Arabian historian of the same name, called also Bar-Hebræus (1226–1286).
3. St. Gall was an Irishman, a pupil and a companion of St. Columbanus in his missionary tours. He founded the monastery of St. Gall, near Constance in Switzerland, about A. D. 612. The monastic school at this place in later years became very famous. (H.)

An excellent influence upon mediæval medicine and its development was exercised, however, by the monastic infirmary at Monte Cassino, and still more eminently and effectively by the school of Salerno. The former was situated in Campania, and was intimately connected with the monastery of Monte Cassino; the latter was in the province of Naples.

The monastery of Monte Cassino was founded by St. Benedict himself on the site of an ancient temple of Apollo. In violation of the rule of its founder, heretofore mentioned, but in compliance with the advice of Cassiodorus, its abbot Bertharius (died 883) taught medicine both orally and in his writings. Nevertheless the monastery continued to be rather a school of practice than of instruction, and miraculous cures seem to have played a prominent part in its activity. After Bertharius, an abbot Alphanus I. distinguished himself, and then Desiderius (born 1027 at Monte Cassino, succeeded in 1086, under the title of Victor III., pope Gregory VII., who died in Salerno in 1085), who left "four books on the miraculous cures of St. Benedict" and founded a hospital, which was enlarged by his successor Odorisius, and afterwards enjoyed important privileges. Here monks from foreign lands came to study, and eminent invalids to receive treatment. Among the latter was Henry II., emperor of Bavaria (972–1024), from whom St. Benedict himself removed a stone by lithotomy during his sleep, placed the stone in the emperor's hand, and finally also healed the wound—a story from which (as well as from the books of Desiderius) we may infer that in this instance, at all events, a magnificent pious fraud was practised. The most famous and important of all the monks of this monastery, however, was Constantinus Africanus[1] (1018–1087 or 1085) of Carthage, who introduced Arabian science into Europe, or rather into Italy. By his travels through all lands (he acquired his education in the school of the mosque at Cairo) he won the title of "Orientis et occidentis doctor". Constantinus was at first for a short time a teacher in Salerno. Having then become a monk in Monte Cassino, he translated into barbarous Latin and recast many works from the Arabic ("De chirurgia", "Pantegni", Viaticum",[2] De pulsibus", "De coitu"—a genuine monkish subject—"De febribus", "De urinis", etc.). His pupil, Hetto or Atto, again converted his wretched translations into Romaic doggerel.

The glory of Monte Cassino, however, speedily faded away, a result to which the increased reputation of the school of Salerno most largely contributed. The latter school attained its highest position in the 12th century, so that even among the German poets of that period a physician of Salerno was regarded as the best of all, outranking even those of Montpellier. In the 13th century the school still retained considerable importance, but from this time forward it declined more and more, though it maintained its existence until the present century.[3] The time and manner

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1. He was called by Berthold von Regensburg (13th century) the "Inventor of Medicine", and associated with Hippocrates, Galen, Avicenna, Macer Floridus and Bartholomæus.
2. The "Viaticum" is a translation of the Zad el-Mosafer, "Provision for the Voyage", of Ebn el-Jezzar; the "Pantegni", a translation of the el-Maliki of Ali Abbas. Constantinus was the first to appropriate the term "variola" to the special disease small-pox, though, as already stated, the term originated with Marius von Avenches in the 6th century.
3. Its existence as a university was terminated by a decree of Napoleon, Nov. 29, 1811, though the Collegium medicum was not discontinued. The university of Salerno was revived by the Bourbons and still exists (Hæser), but it is now an institution of very little importance. (H.)

of the founding of the school of Salerno are unknown and uncertain, and on this subject conjectures only can be advanced.

Salerno was founded by the Romans as early as B. C. 200, and, in consequence of its charming situation and climate, enjoyed among them the reputation of a climatic health-resort, with many of which they were acquainted. It is therefore probable that physicians were always located here, and we know that among the Romans all physicians might be teachers also. After the establishment of Christianity, however, Salerno became likewise a resort for pilgrims, as well as a kind of medical establishment, in consequence of the fact that in its cathedral were to be found the bones and other relics of St. Matthew and the three saints Thecla, Susanna and Archelaïs. To these bones a bishop Adalberon made a pilgrimage in 984, but without receiving any benefit. The city of Salerno at an early date received also a Benedictine monastery. Charlemagne, as early as the year 802, is said to have founded a school here, as he did in so many other places.—Subsequently the city fell, as we know, into the possession of the Normans, whose reign is important in the history of civilization through its cultivation of the sciences in the schools of lower Italy. Famous schools existed at Amalfi and Naples, as well as in Salerno. In Amalfi the Norman jurisprudence (which was entirely independent of the clergy) was taught; in Naples Græco-Italian law.—From the peculiar fact that Salerno was both a watering-place and a resort for pilgrims it is possible that a more lively interest in medicine proper may have always prevailed there, especially as many Benedictines, under the guise of monkish physicians, followed, and inculcated in others, the advice of Cassiodorus to read Hippocrates and Galen. Perhaps too they saw that miracles alone were insufficient to retain their reputation, and that the cure of disease brought emolument. Besides this the Greeks of neighboring Sicily may, and subsequently the Arabians of the same island must, have exercised some influence: for as early as the 11th century Arabian physicians were studied in Salerno, while up to this time the Greek writers alone were employed as the basis of instruction. The "Hippocratic Union" —"Collegium Hippocraticum"—may have been instituted in order to study and expound the ancient writers, for at this period (indeed, in the Carlovingian age) the first impulse toward the study of the classics had developed, to be followed by an interruption until it burst into bloom in the 15th and 16th centuries. By degrees this association acquired the greatest fame, until it gained for the city itself the title of "Civitas Hippocratica." Ordinary citizens of the latter might become fellows of the college. Pupils, teachers and fellows were exempt from taxation, as in the schools of Rome, an arrangement which, at all events, furnished an inducement to join the college. Among the earliest members of this society belonged, probably, a Jew Elinus, a Roman Magister Salernus, an Arabian Adala and a Greek Pontus, who are mentioned as the first teachers of medicine in Salerno. Each is said to have taught his own countrymen, and each in his native tongue; for all these languages, besides the lingua volgare, were met with in lower Italy and Sicily. (Gregorovius.)

Now, as Salerno lay upon a mediæval thoroughfare and military high-road, the "Studium Salernitanum" (Lyceum, Gymnasium), through the influence of an acquaintance with the arrangement of the Arabian academies — an acquaintance easily made by reason of the propinquity above noticed — may have assumed the functions of a college, modelled, perhaps, after similar institutions among the Arabians. Accordingly Jurisprudence, Philosophy, Theology and Medicine were all finally taught there, as in the Arabian academies. The fact that the institution was never properly a school of monks,[1] but from its very origin possessed married teachers, points also to an Arabian origin. Indeed even women, genuine mediæval female professors (like the species recently revived in Pavia), taught here—a purely western innovation. Of Arabian or Nestorian origin was also most probably the title of "Magister" or "Doctor" (a translation of the title Rabbi[1] or Rabban) introduced at Salerno, and solemnly bestowed on graduation. This title made its appearance in the middle of the 12th century, but did not become common until later, because the granting of it being a privilege of the universities, its frequency increased with the number of the latter. The ceremony of graduation or promotion was performed in public, and demanded of the candidate the fulfilment of the following preliminary conditions: seven years' study, the attainment of the age of 21 years, a satisfactory examination in the Hippocratic, Galenic, and Arabian writings, legitimate birth,[2] a promise to teach correctly, and in accordance with the received doctrines, to administer no poisons, and to treat the poor gratuitously—some of which conditions are required of our candidates to-day. These requirements all fulfilled, the candidate received a ring, a wreath of laurel, a kiss, and finally the benediction — and thereafter he could teach and practise wherever he wished. After graduation the office of teacher was open to all, as it was later in the first universities. Some of the teachers received a salary of twelve ounces of gold.

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[1] Hence too its tolerance of Jews, which was likewise great among the Arabians. The Jews were the "Kammerknechte" (slaves) of the emperor.

The tendency of the school or university of Salerno (which, according to Marx, dates back into the 6th century, though first definitely mentioned in 846) was entirely and eminently practical. Hence it laid great stress on symptomatology, dietetics, treatment and materia medica, and less, in accordance with the age, upon physiology and human anatomy. Still the latter was even then estimated of such consequence that Salerno's patron, Frederick II. (1194–1250), introduced a special provision with respect to its study there into his medical code. From this provision too the statement that, by the emperor's direction, a dissection was made every five years, gains great probability. Probably too this regularly recurring dissection took place in Salerno itself. The practical bent of the school may also be inferred from the fact that considerable importance was laid upon the manner of the physician, an apparently subordinate matter which is also of considerable weight in the life of our practising physicians to-day. What craftiness was then recommended we may judge from the precept that the physician should say to the patient that he will recover; to the relatives, that he is very ill. If he dies, it will then be said that the physician foresaw the result; if he recovers, his reputation will likewise be increased. It sounds curious (and is a sign of the times) to read that the physician should not

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1. Steinschneider has recently (1868) published a Hebrew treatise on pharmaceutics, written about the middle of the 10th century by a Jew who styles himself "Sabbatai ben Abraham, called Donnolo, the Physician". The author was born near Otranto, probably about 913, and with his family made prisoner by the Arabians in 925. Donnolo was subsequently released and applied himself to the study of medicine and astrology. His work consists of an enumeration of 120 drugs, almost exclusively from the vegetable kingdom, with directions as to their preparation for internal use or for plasters and salves, and, according to Hæser, it bears throughout the stamp of originality. (H.)
2. Legitimate birth was demanded in our universities down to modern times; indeed it is réquired even to-day for the attainment of military grades.

pay too much regard to the wife, daughter or female servant of the patient; that, when invited to take a meal, he should be modest and temperate, and should look after the patient frequently during the meal, that he may not seem to forget the latter in the pleasures of the table etc.

The two chief works of this school are the "Compendium Salernitanum" and the "Regimen Sanitatis" (Flos vel Lilium Sanitatis).

The "Compendium" is the first example of a complete text-book of medicine, like our modern encyclopædias of medicine and surgery, in which many experts work under the direction of a single responsible editor. The six following writers were co-laborers on the standard text-book of Salerno: Pontus, Petronius, or Petrocellus (about 1035), Copho, John of Milan (Johannes Afflacius,[1] Joh. Medicus, Joh. Magister), Barthol. Ferrarius and Joh. Platearius. Especially prominent are the doctrines relative to venesection, the pulse, the urine and fever, all of which are treated chiefly on Hippocratic principles. The second work is a Latin poem, consisting of verses rhyming at the end and frequently also in the middle. The poetic form, however admirably it may be handled in itself, and however true a model it may be of mediæval versification, is badly suited to the medical, by no means poetical, and often quite commonplace, topics of the work. Such verse-making became a genuine mediæval fashion among Christian writers from the days of Gregory Nazianzen (328–390), who lived under the emperor Julian. The object was often simply to facilitate the learning of the text by heart, as in the Latin grammars from the Middle Ages down to the present day. We must not infer from the example of these grammars, however, that all poetic inspiration was lacking in these mediæval poems. Even the passion of Christ was described in verse and dramatised, a mediæval custom from which the modern drama took its origin, just as the Greek drama was invented by the priests as a change in their religious services. Remains of these plays are preserved to us in the carnival plays and "Passionspiele" of Oberammergau. The whole school was originally named as the author of the poem. "The whole school of Salerno writes to the King of England" (to wit Robert, son of William the Conqueror, who was cured of a wound at Salerno in 1101).[2]

As examples of the contents of this poem we quote:

"Anglorum regi scribit schola tota Salerni:"
"Si vis incolumem, si vis te vivere sanum,"
"Curas tolle graves, irasci crede profanum;"
"Parce mero, cœnato parum; non sit tibi vanum"
"Surgere post epulas; somnum fuge meridianum;"
"Ne mictum retine, ne comprime fortiter anum."
"Hæc bene si serves, tu longo tempore vives."
"Si tibi deficiant medici, medici tibi fiant
Hæc tria: mens læta, requies, moderata diæta."

[Translated by Prof. Ordronaux:

"Salerno's school in conclave high unites
To counsel England's king, and thus indites:

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1. Johannes Afflacius, a pupil of Constantinus Africanus and author of two treatises entitled "De febribus" and "Curæ Afflacii", is not usually indentified with John of Milan, though undoubtedly a contemporary of the latter. (H.)
2. John of Milan (about 1100), president of the school of Salerno, is also named as the sole author of this long poem, consisting of more than 2000 lines.

If thou to health and vigor wouldst attain,
Shun mighty cares, all anger deem profane;
From heavy suppers and much wine abstain;
Nor trivial count it after pompous fare
To rise from table and to take the air.
Shun idle noonday slumbers, nor delay
The urgent calls of nature to obey.
These rules if thou wilt follow to the end,
Thy life to greater length thou may'st extend." H.]

"Sex horis dormire sat est juvenique senique,"
"Septem vix pigro, nulli concedimus octo."

"Ex magna cœna stomacho fit maxima pœna:"
"Ut sis nocte levis, sit tibi cœna brevis."

"Post cœnam stabis, aut passus mille meabis."

"Non sit acetosa cerevisia, sed bene clara,"
"De validis cocta granis satis ac veterata:"
"De qua potetur, stomachus non inde gravatur."
"Grossos humores nutrit cerevisia; vires"
"Præstat, et augmentat carnem, generatque cruorem;"
"Provocat urinam, ventrem quoque mollit et inflat."

[This poem, under the various titles of Regimen Sanitatis Salerni, Schola Salernitana, Medicina Salernitana, De Conservanda Bona Valetudine, Flos Medicinæ etc., enjoyed the most unexampled popularity during many succeeding ages, and was in fact the *vade mecum* of every well-educated physician for centuries. Zach. Sylvius, in an edition of the Schola published at Rotterdam in 1649, declares "Nullus medicorum est, qui carmina Scholæ Salernitanæ ore non circumferat, et omni occasione non crepet." M. Baudry de Balzac counts from 1474 to 1846 no less than 240 different editions of the poem, and Hæser says that 81 manuscripts of the work are now known to exist. It has been translated into English, French, German, Italian, Irish, Polish, Provençal, Bohemian, Hebrew and Persian. Choulant mentions four English translations[1] of the Schola, and a fifth was published by Prof. John Ordronaux in 1871.

The poem in its present form is undoubtedly a composite work, enlarged by the accretions of ages. The first edition, published probably in 1474 with a commentary of Arnold of Villanova, contained only 364 lines and was purely dietetic in its character. De Renzi has collected from the various MSS. and editions no less than 3526 verses, many of them of comparatively modern origin, though others borrowed from Macer Floridus, Ægidius of Corbeil etc. may equal in antiquity those of the original poem. It is curious in this connection to observe the reference to inoculation contained in the following verses of a later edition:

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1. By Thomas Paynell, an English clergyman, in 1530; a metrical translation by John Harington entitled "The Englishman's doctor or the schoole of Salerne", 1607; Regimen sanitatis Salernitanum, or the schoole of Salerne's regiment of health", text and metrical English translation by P. H(olland), London, 1649; an edition by Alex. Croke, Oxford, 1830, Latin text, an old English translation, historical introduction and notes. Ordronaux also speaks of a translation made in 1575, the MS. of which exists in the library of Corpus Christi College, Oxford, but has never been published, and of another version made and published in 1617. Of the latter I know nothing. (H.)

ADVERSUS VARIOLAS.

"Ne pariant teneris variolæ funera natis,
Illorum venis variolas mitte salubres;
Seu potius morbi contagia tangere vitent
Ægrum, ægrique halitus, velamina, lintea, vestes,
Ipseque quæ tetigit male pura corpora dextra."

Everyone will also recognize in the following lines the source of one of our common proverbs:

DE POTU.

"Si tibi serotina noceat potatio vini,
Hora matutina rebibas, et erit medicina." H.]

As early as the ninth century teachers were active in the school of Salerno, and among these we find the names of Josua, Josep medicus and Ragenfrid, yet even the circumstances of life of the following physicians are not satisfactorily settled.

In the 11th century (he died before 1056) lived **GARIOPONTUS** (also called **WARIMPOTUS**, **RAIMBOTUS**),
who, in a work entitled "Passionarius Galeni" and compiled from Galen and other Greek writers, as well as in a lesser degree from the Arabians, advanced measures and views conformable to the age: e. g. "On the island of Delphi a painful molar tooth, which was extracted by an inexperienced physician, occasioned the death of a philosopher; for (!) the marrow of the tooth, which originates from the brain, when lacerated, ran down into the lungs and killed the philosopher."[1] (Extraction of teeth at that time and long after was considered by regular physicians a frightfully dangerous operation, though itinerant quacks drew them out without hesitation.) We, however, find in Gariopontus the first intimation of the inhalation of narcotic vapors, while the Ancients were acquainted only with anæsthesia by compression and the Arabians with the internal use of mandragora and belladonna![2] (Corradi.)

Not long afterwards **COPHO** the younger (first quarter of the 12th century; the elder Copho is mentioned by Trotula)
wrote, in accordance with views of Hippocrates, Galen and the Arabians, an "Ars Medendi" and an "Anatomia Porci" — the latter in spite of the fact that he was, probably, a Jew. The "Anatomia" also mentions the connexion between the lymphatics and veins.

Better known, however, is **NICHOLAS PRÆPOSITUS**, President of the School of Salerno during the first half of the 12th century (about 1140), whose "Antidotarium" acquired great popularity as a pharmacopœia in the Middle Ages, though (or perhaps rather because) among its remedies cer-

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1. Probably the tooth itself was drawn into the trachea during inspiration. (Baas.) The Latin text runs: "Apud Delphos enim insulam molaris dens tantum dolens ab imperito medico avulsus causa fuit mortis philosophi, quia medulla dentium a cerebro principatum habens, dum crepuit, in pulmonem descendens occidit philosophum." (H.)
2. Herodotus tells us that the Scythians were accustomed to intoxicate themselves by inhaling the vapor of hemp-seed, and both Dioscorides and Pliny mention the anæsthetic power of the mandragora and its use preparatory to surgical operations. (H.)

tain prescriptions of St. Paul, and others handed down even from the prophet Elias, are introduced. The same work contains our recently obsolete apothecaries' weight:

20 grana	1 scrupulus,
3 scrupuli	1 drachma,
1½ drachmæ.	1 hexagium,
6 hexagia	1 uncia,
12 uncia	1 libra,
2½ libræ	1 sextarius,

and also brings forward the anæsthetic mentioned at a later period by Hans von Gersdorf.

Nicholas was also the author of a "Quid pro Quo", that is an alphabetically arranged catalogue of equivalent drugs, capable of replacing each other, when for any reason one or the other drug was wanting — an event which must have frequently occurred, especially with foreign drugs, in consequence of the imperfect commercial relations of the period. (From the title of this work sprang our common expression "Quid pro Quo".)

In the middle of the 12th century Mathæus Platearius (son of Johannes Platearius,[1] who composed a "Practica Brevis" in accordance with the views of the old physicians) wrote "Glossæ" or commentaries on the preceding work, and a treatise "De Simplici Medicina" (called also from its initial words "Circa Instans").

Maurus, Urso, Petrus Musandinus the teacher of Ægidius, Salomon and Joh. Castalius were also famous teachers at Salerno during the 12th century.

To the last half of this century, in which physicians were ever poetically disposed, belongs Ægidius "Corboliensis", so named because born at Corbeil near Paris.

On his return from Salerno he became ordinary physician to King Philip Augustus (1165–1213), and sang in verse "De Urinis", "De Pulsibus", and "De Laudibus et Virtutibus Compositorum Medicaminum". In this latter poem he already laments the decline of Salerno, and ascribes the retrogression of medicine to the circumstances that physicians pushed aside as useless all books which did not contain recipes, and that the right to teach in the school had been granted to youthful "sprigs and immature boys".

Alcadinus of Syracuse (12–13th centuries), physician to Frederick II. and a teacher in Salerno,

composed a poem in elegiac measure "De Balneis Puteolanis": Otho Cremonensis, who belonged to the beginning of the 13th century, wrote a similar poem in simple hexameters "De Electu Medicamentorum Simplicium".

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[1] Johannes Platearius was the inventor of the term "cataracta" in place of the old-Egyptian term signifying "ascent" and the Greek "hypochysis", in classical Latin "suffusio humorum". (Hirsch.) Much confusion exists with reference to the precise period of the Platearii and their relationship to each other.

Google

Among the female physicians who proceeded from the school of Salerno

TROTULA DE RUGGIERI[1] (or Eros)

wrote, with other works, a treatise entitled "De passionibus mulierum ante, in et post partum", in which she gives directions for perinæorraphy. To determine the sex of the fœtus she advises to drop three drops of blood or milk from the right side into water: if the fœtus is a female the drops will float on top; if a male they will sink.

ABELLA,

without prejudice to the lovely modesty of her sex, and as a still unattained ideal for our "doctresses" of the present day, who for the sake of decency are forced to confine their attention to the heart, bubbled over with poetic enthusiasm in some verses "De natura seminis hominis", and also wrote a treatise "De atra bile". The most famous among the female physicians, however, was

COSTANZA CALENDA

(distinguished, like most of the ladies of Salerno, for her beauty), who lived under the equally beautiful and notorious Joan II. of Naples (1414–1435), but left no writings.

MERCURIADIS (15th century)

composed treatises "De crisibus", "De unguentis" and "De curatione vulnerum".

REBECCA GUARNA (15th century)

wrote works entitled "De febribus", "De urinis" and "De embryone".

These doctresses all lived between the 12th and 14th centuries,[2] and, as we have seen, wrote on all medical subjects, but particularly on gynæcology and midwifery. Later Salernian physicians, who translated and followed the lead of the Arabian writers on medicine, and thus laid the foundation of the subsequent decline of the school of Salerno, were:

ROMUALD II. bishop of Salerno (1153–1181),

who died in the office of physician to the pope;

FRANCISCUS ALPHANUS,

who wrote "On the plague, pest-fever, malignant fever, small-pox and measles";

JOH. NICOLAUS DE ROGERIIS,

a physician of Venice in the beginning of the 13th century, and

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1. According to Handerson "Trotula" is merely the title of the book, which was written by a man, while Trotula is always mentioned in the third person. (Baas.) The translator, while not insensible to the delicate flattery of the author in quoting him as an authority on a question which may perhaps be called the pons asinorum of medical historians — the identity of Trotula and the authenticity of the work which bears her name—feels called upon, in the interests of truth, to say that his opinion (expressed in the "School of Salernum") was based entirely upon the results of an examination of two early MSS. by Malgaigne, and was, quite naturally, substantially the opinion of that eminent surgeon. As Daremberg and De Renzi, after a similar examination of various MSS. of the work ascribed to Trotula, arrived at conclusions diametrically opposite to those of Malgaigne, affirming the undoubted identity of Trotula and the substantial authenticity of her work, the translator, in imitation of the example of the pious and puzzled Ibn Khallikan, can only exclaim, "God knows best which of these statements is true!" (H.)
2. Trotula is believed by Daremberg to have been the wife of John Platearius the elder, who flourished in the 11th century, while several of the other "doctresses", as the author himself states, lived in the 15th. (H.)

JOHANNES VINCENTIUS, and
JOHANNES VITUS DE ROGERIIS.

[Other writers of the school of Salerno, who deserve mention, were:

MAGISTER SALERNUS, who flourished about the middle of the 12th century and wrote the "Tabulæ Salerni", a short treatise on the virtues and effects of medicine, and a "Compendium".

BERNARDUS PROVINCIALIS, who wrote about 1155 an interesting commentary on the "Tabulæ" of Salernus, in which he endeavors to simplify the materia medica by eliminating foreign drugs, as far as possible; and

FARRAGUTH (Farragius, Farragus), a learned Jew, educated at Salerno, who translated into Latin the "Continens" of Rhazes in the latter part of the 13th century.

The Salernian surgeons Roger, Roland and the "Four Masters", the famous oculist Benvenuti Graphæus, and the pharmacist Saladino d' Ascoli, are noticed hereafter. (H.)]

The profound importance of Salerno as regards medical culture depends not upon any memorable contributions to science which proceeded from her school, but rather upon the fact that within her "Hippocratic Society" the principles of the great physicians of antiquity were at first cultivated independently, and subsequently, when received through the medium of the Arabians (though in a corrupted form), were carefully preserved. Her school too (again after the example of the Arabians) maintained and secured the influence of the laity upon the progressive development of medicine at a time when the priests especially were again active in passing off their stale devices for a science of healing. It promised to free work a field of action, since, so far as was possible at that day, it held itself aloof from the fetters of the fanatical Church. Thus her school attained an extended, and even an international, importance; for here taught, studied and interchanged ideas, Arabians and Jews as well as Christians. It was, like Alexandria, one of the historic bridges, over which ancient culture, and particularly ancient medical culture, took its way during the Middle Ages from East to West. Salerno was also the medium by which Arabian pharmacy and therapeutics were introduced into the medicine of the West. It is also in the highest degree probable that she borrowed from the Arabians the principle of arrangement of her school, to transmit it again in the sequel to the European universities. The latter may, therefore, be considered offshoots of Oriental civilization, matured and naturalized among us.

If, however, Salerno may be considered the forerunner and model of the later universities, the same holds true in a greater degree of the

SCHOOL OF MONTPELLIER,

so important not only in medicine, but in the entire culture of the West, and, possibly, a direct continuation of a Roman institution of learning. Montpellier also resembles Salerno in this respect, that here too the Ancients (especially Hippocrates) and their principles found still some cultivation, though Galen and the Arabians were the chief authorities. Another point of comparison between the two is found in the fact that the physicians who proceeded from her school did not lapse unconditionally to the Church or to its mediæval philosophy (though according to our views they certainly suffered strongly therefrom), and preserved, in part at least, reasonably practical principles. Finally Montpellier resembles Salerno in the fact that the reputation of her school was so great, that to have studied there also lent a special halo of glory to the physician. Besides, though her teachers were compelled to be unmarried clergy, she preserved a small portion of reasonable pagan thought, and demonstrated the practical scientific tendency of her school by the fact that from 1376 onward an annual dissection of the corpse of a criminal took place here.

Montpellier, "Lovely Montpellier", — Mons Pessulanus — which, like Salerno, occupies a charming position not far from the sea and in the vicinity of baths, was, as early as the year 1153,[1] so famous and successful as a school of medicine, that many, "who only intended to study philosophy more thoroughly, became her pupils". Within her walls sojourned (doubly praiseworthy in so dark an age) both Christians and Jews, the latter of whom were subject directly to the civil authorities. The Jews were especially important as translators for the West. One of the most famous of the Jews of Montpellier was Profatius Judaeus (Yacub ben Makir), a mathematician, astronomer and physician, who was even Rector of the Faculty. Until 1220 (when cardinal Conrad, a German, first established a satisfactory examination as the condition of entrance upon the office of teacher) every graduate could teach here, as at Salerno. Subsequently Montpellier (which was until 1370 subject to the pope, then to the kings of France) received a faculty of philosophy and of law, and a rank similar to that of the University of Paris. Yet even to this day the school of medicine remains her chief ornament.

One of the most illustrious and famous pupils of Montpellier was the religious mystic and alchemistic visionary,

RAIMOND LULL, "Doctor Illuminatissimus" as he was called, a would-be transmuter of metals and searcher for the philosophers' stone, which in this century began to be extolled as a means for the preservation of eternal health.

Born in a high station at Majorca in 1235, in his youth he served Venus (that not entirely heavenly goddess, though a deity who frequently supplies sons and daughters of heaven, i. e. monks and nuns—after they reach old age) with such faithfulness, that, as early as the age of 30, he received visions, and became wonderfully pious. Accordingly he entered the order of Minorites, learned Arabic, and then went on a journey to northern Africa to convert the Saracens. The Saracens, however, declined to learn anything from him, so he returned again to Italy, only, however, to go back to Africa. Once more, persecuted and harassed, he journeyed back to Italy, but, in spite of his earlier and double unfortunate experience, ventured once again to Africa, and was there stoned to death in 1315 as an importunate missionary by the Saracens, whose patience was finally exhausted. Besides alchemistic and philosophico-theological works, among which is his "Ars magna", he wrote also on medical subjects, viz.: "De pulsibus et urinis"; "De medicina theorica et practica"; "De aquis et oleis"; etc. "Like all great minds of the Middle Ages" (Heine) Lull passed for a sorcerer in league with the devil. Some regard him as a lunatic, others as a remarkable man. He was, at all events, a notable spirit. His important chemical works undoubtedly owe their existence to his acquaintance with the Arabians.[1]

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[1] Montpellier is said to have been founded in 738. The first mention of the study of medicine there occurs, however, in 1137, when bishop Adelbert II. of Mayence visited the city to listen to its medical teachers. At this period it is said:

> "Hic et doctrina praeceptaque de medicina
> A medicis dantur, qui rerum vim meditantur."

The Faculty of philosophy was added in 1242, and that of law in 1298. (H.)

Bernard Gordon,[2] a Frenchman,

who wrote a famous compendium of medicine under the title "Lilium medicinæ", was a teacher at Montpellier from 1285 to 1307. That he worked under Arabian influence is evident from his statement that small-pox and measles originate from conception occurring during menstruation. On the other hand he betrays evidences of scholastic speculation when he announces that the bile descends in the third hour, black bile in the ninth, but mucus in the evening. He also lays great weight upon the constellations, but, like a "canny Scotchman", also pays especial attention to the purse, i. e. the wealth or poverty of the patient. Gordon is the first medical writer to mention the use of spectacles, but praises highly his own eye-water, by the use of which he could render them unnecessary.

Still better known is the compendium of

Gilbert of England (1290),

which, with the lack of taste characteristic of his age, he has entitled "Laurea Anglicana".[3] In this work he embraces Arabian and scholastico-Galenic views, but would have gladly followed Hippocratic principles, if, as he says—he had been willing to pass for a fool! Leprosy, the results of impure coitus, the exhibition of mercurial preparations and of acetate of ammonia, the virtues of sulphurous waters etc. are well described in his book. How much nonsense (besides what may be regarded as reasonable for that day) was then classed under the head of medical science may be judged from the following statement: lice spring partly from the blood and mucus, partly from the yellow and black bile; the vital spirits in the body take a direct, the animal spirits a circular course; the conscious soul is no bare form, like the vegetative, hence the former is immortal. In cases of stone he administers the blood of a he-goat which has eaten diuretics; lethargy, however, he "treats" by tying a lusty sow to the bedstead, that the healing influence of a vigorous grunt, close at hand, may be felt by the patient. Still more absurd, however, than this psychical drastic is the advice in sexual debility to carry a scrap of paper inscribed with arrant nonsense! But alas! all this is no unheard-of exception in the history of the treatment of the sick.

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[1] Lull wrote his works in the Spanish language. Humboldt calls him a "singularly ingenious and eccentric man", and ascribes to him a notice of the mariner's compass in 1286, and of the astrolabe in 1295.

[2] Gordon, though of Scotch descent, seems to have been born in France and educated at Salerno. The "Lilium medicinæ" was written in 1305. Hæser calls it a work "thoroughly independent, and rich in observations". (H.)

[3] It is probably fair to say that Gilbert's work is neither better nor worse than those of his contemporaries. We find the same scholastic, speculative nonsense, the same polypharmacy and the same superstition. Little else could be expected in a work compiled largely from other writers. If Gilbert was not educated at Salerno, he certainly displays an intimate acquaintance with the literature of that school, quoting Copho, Gariopontus, Constantinus, Romuald, Nicholas Praepositus and Maurus, while the surgical portions of his work coincide too closely with the writings of Roland of Parma to permit us to think the agreement accidental. Gilbert also quotes Magister Ricardus "omnium doctorum doctissimus", but which of the several physicians bearing this name is referred to it is difficult to decide. However, there was an English physician of this name, residing in Paris (he died there in 1252), several of whose works still exist in MS., e. g. "Micrologus magistri Ricardi Anglici", a treatise on the causes, signs and cures of diseases, and "Tabulæ Ricardi Anglici medici, cum commentario Joannis de Sancto Paulo et glossulis in eas". Thus Gilbertus Anglicus was not the first English writer on practical medicine, but only the earliest whose works have been published. The work of Bartholomæus Anglicus, an English Franciscan monk (about 1250), entitled "De proprietatibus rerum", treats of a few medical subjects incidentally. (H.)

Still more famous was the "Rosa Anglica" of John Gaddesden, which appeared between 1305 and 1314.

Gaddesden lived at Oxford, was (like Gilbert[1]) physician-in-ordinary to the king of England, and a professor in Merton College, Oxford (founded 1264), the same institution in which Harvey officiated at a later period.

His scholastic subtilties, mysticism in the use of remedies, nonsense, taint of medical avarice, superstition and charlatanry, as well as his disgusting therapeutics, may be charged in part to the times. Examples of the latter are hog's dung in hæmorrhage, the daily insertion of one's own finger into the anus to relieve the pain of stone, cathartics for crab-lice, the imposition of hands by the king of England (which included also the king of France) for scrofula[2] etc. He (like our law) advises the physician to stipulate his fee in advance, gives a summary of those diseases in which the physician earns little, and distinguishes between the medicines for the poor and the rich. Yet he remarks, fairly enough, that if the laity were well versed in our best arcana, they would esteem our art lightly, and despise the physician.

Arnold of Villanova (near Montpellier),

having abandoned theology, studied medicine at Montpellier. He lived from 1235 to 1313 a very stirring life, travelled extensively, and at the close of the 13th century was a teacher at Barcelona and ordinary physician of Peter III. of Aragon. Thence he fled to Paris, after falling under the ban because of his sensible declarations that the bulls of the popes were human works, and that acts of charity were dearer to God than hecatombs etc., etc. Accused of alchemy, he was again compelled to flee, went thence to Montpellier, Bologna, Rome and Naples, and finally perished by shipwreck as he was sailing from Palermo to the pope, who, personally, held him in high esteem. Fanaticism still persecuted him after death in his very works, some of which were condemned by the Inquisition. Arnold, however, merits no less esteem for his views in so dark an age on religious matters (condemned as they were for heresy) than for his medical and surgical knowledge and the praise which he bestows upon Hippocrates, Galen, and even Rhazes and the teachers of Montpellier, because they promoted rather experiment than mere speculation. Yet he was given to the Arabico-Galenic subtilties of his time, was a profound devotee of astrology, and was not free from a

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1. Gilbert was never ordinary physician to the king. Gaddesden was the first native Englishman who held this position. The latter is said to have treated the son of Edward II. of England, when suffering from small-pox, by surrounding him with scarlet wrappings and curtains. See p. 58, note. (H.)
2. This ceremony is said to have been first performed by Edward the Confessor (1042–1066). A special "Service of Healing" was used in the English Church in the reign of Henry VIII. (1484–1509). (H.)

belief even in witchcraft. Moreover he inculcated the use in practice of open swindling and fraud: "If thou canst find nothing by an examination of the urine, declare that an 'obstruction' of the liver exists. If again the invalid says he suffers from headaches, thou must say they spring from the liver. Particularly, however, use the word 'obstruction', since it is not understood, and it is of great importance that people should not understand what thou sayest." Let us compare this not very honest advice (even if taken as a joke) of a Christian with the precepts imparted to the Indian physician—and we must praise the morality, not of the Christian, but of the "heathen"! Arnold's "Parabolæ" and especially his "Breviarium", "De Vinis" etc. were very famous. He was also the first to administer brandy, which he regarded as the elixir of life.

Similar things are to be found also in the treatise "On the fistula in ano"[1] by the physician John Ardern, who flourished as a surgeon in Newark in 1349, and settled in London after the middle of the 14th century. Subsequently he served as an army-surgeon in France. Ardern had probably studied at Montpellier, as well as the Portuguese Valescus de Taranta (1382–1417, ordinary physician of Charles VI. of France), who also wrote on surgical subjects, and among other things was acquainted with the taxis. To the school of Montpellier are also assigned Gerardus a Solo, professor there, and Gulielmus de Brescia (Guil. Corvi, 1250–1326), ordinary physician of Clement V. (died 1314). Connected with this school were also Raimond Chalin de Vinario, a contemporary of Gui de Chauliac, and, like the latter, ordinary physician at Avignon ("De peste libri tres"); Johannes de Tornamira (about 1400), ordinary physician of several popes, and for a long time chancellor of Montpellier, and the surgeon and anatomist Henricus ab Hermondavilla, teacher of Gui de Chauliac at the school of Montpellier, to whom we shall again return. The last mentioned of these physicians should stand forth with other prominent spirits as the light of a better age. And such an age must come, unless all science, and every moral law which alone supports it, should utterly perish! How must all the good taste of any period have disappeared (doubtless a trifling matter compared with the evils mentioned), when most writers chose titles for their works after the style of ballad-singers, and treatises describing the plague, gonorrhœa and chancre, were labelled "Flowers and Lilies of Medicine"! Indeed, even men of science no longer hesitated to teach confessed superstition, to mingle this unblushingly with open deceit, and, in opposition to the interests of the most needy of their fellow-creatures, the sick and the poor, to choose the measure of their hoped-for fee as the level of medical extortion!

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3. This is an extract from a large work written by Ardern, and entitled "Practica". It was written in Latin, but the extract on fistula was translated into English and published by John Reed in 1588. Manuscripts of the "Practica" exist in Oxford and London, but the complete work has never been published. (H.)

3. INFLUENCE OF THE CRUSADES (BETWEEN 1096 AND 1270), OF MEDICAL LEGISLATION, OF THE UNIVERSITIES AND OF CHRISTIAN PHILOSOPHY (SCHOLASTICISM), UPON THE MEDICINE OF THE LAST CENTURIES OF THE MIDDLE AGES.

Faith, though not the sole lever by which the Middle Ages were moved, was yet almost their sole rule of conduct. That wonderful plant, for which the ground had been prepared by the fallen people of Antiquity and the Neo-Platonic philosophy, struck its roots deeply and securely in the ancient ages of persecution. But it was not until removed entirely from the reach of sober pagan speculation that it shot up luxuriant and strong in sap and leaf, and finally overspreading all other spiritual emotions, not only robbed them of the clear light of day, so essential to their gladsome growth, but absolutely stifled them in the damp gloom of delusion. Its bloom, like the famous flower of night, unfolded itself with explosive force in the "God wills it" of the Crusades, and, by the fascination of its magic fragrance, stupefied with religious intoxication the whole of mankind attuned to romance—an intoxication which only gradually wore off under the influence of long and destructive military expeditions.

A great part of the high value of the Crusades in the development of civilization among the masses depends assuredly upon their guidance towards health of this universal and insane morbid faith. For centuries the bigoted semi-activity of the human mind, turned ever in one direction and occupied solely in the sphere of faith, had too strongly aroused the imagination, and excited unhealthy yearnings after unattainable happiness. With historic necessity, therefore, this universal morbid tension was compelled to relax itself in those expeditions, which, to us who are weaned from the faith and live in a more healthy atmosphere, appear absolutely quixotic,—expeditions in which even children joined, and which had no other object than the seizure of a sepulchre existing only in the eye of faith.[1]

In another respect, however, the historic results of these expeditions, which seem to us such pure ventures of the faith, were extremely important in the development of humanity in the West. They brought the rude inhabitants of the West (whose emperors could not all even read) into contact with the highly cultivated Saracens, then in the bloom of their civilization, and with the oriental, though mistaught, Greeks, and in this way awakened the impulse and germ of civilization deeply slumbering in the West. Moreover they opened the way for the crushing of the political and spiritual supremacy of the pope and the clergy in general, whose mandates thereafter no longer preserved absolute and unlimited sway, and whose teachings and lives henceforth suffered sharp criticism. The crusading knights themselves first ventured to set the religious authorities at defiance. The bondmen, in common danger, learned to follow their example, and thus a threefold emancipation of mankind, political, social and spiritual, was introduced by the Crusades. Again the Crusades awakened commerce by the wish to obtain the products and objects of luxury, which the Crusaders had learned to know, and extended it to other maritime countries than those heretofore frequented (Venice). Moreover the knowledge of remote lands excited, even in the lower classes, curiosity and the desire for discovery, or rather for travel, and showed likewise that the despised unbelievers and their wives were not quite so bad as the sermons at home painted them, so that the credibility of the latter received a shock. In comparison with such great gains to posterity, the temporary over-cultivation of eastern astrology and theosophy, and of Oriental sensuality, besides the free intercourse of the sexes already existing in the West, was of merely momentary importance.

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[1] Out of the same impulse grew the cathedrals, which, since that period, have existed everywhere, and by the size, expensiveness and magnificence of which it is desired to honor and propitiate God and the Saviour—a sign how greatly the inner spirit of Christianity has decayed, and how greatly the power of the priesthood has grown. If a new epoch and style of art, the Christian, was happily thus created, yet all these magnificent structures had, on the other hand, a gloomy side: the deepest superstition ruled the masses, and under its influence they spent their means; and while the priests served God with show within the cathedrals, the poor people, for whom "salvation" was chiefly designed, starved outside. The ministers of God preached to them only of the joys of the future life, while they appropriated to themselves by anticipation in this life a great number of pleasures offered to others hereafter as the reward of virtue. If this too was an historical mission (as some affirm), it was at least a very dubious one!

The evil last mentioned was maintained in a great degree by the laxity of morals so highly developed in the preceding barbarous ages (a laxity which was probably only a simple animal conception of sexual life), and which by the excesses of the "nobles" was carried down into the otherwise despised and dependent ranks of society. As early as the days of Charlemagne (who, with his daughters and his court, as well as the contemporary clergy, lived by no means in sexual chastity) brothels had made their appearance; but even earlier some of the monasteries were not much better, so that even St. Boniface (680–755) strongly recommended to the episcopal shepherds to keep an eye over the lambs in the nunneries, and particularly enjoined upon them to see that the abbesses were chaste and temperate. About the year 1000 severe lectures against the rude drinking and plays of the monks (which were characteristic of the age) and against their filthiness and godlessness were more frequent. Similar castigation was bestowed upon their foppishness in dress, which was adopted certainly not with an eye to please God. The evil was increased when pope Gregory[1] made a class of uncastrated eunuchs secular and parochial priests, and their unheard-of excesses to the close of the Middle Ages prepared the soil for the reception of the Reformation by the people. To this was added a general and "amiable" service of the ladies (of which the poets have often sung), and which in practice was not limited to Platonic love—indeed quite the contrary. This gallantry extended from noble ladies and maidens above down to the very menials below, so that, as is well known, in this and succeeding ages, for the security of female honor and the matrimonial state, lock and bar were frequently applied to the female genitalia! The disproportion between the sexes—there were seven women to one man; the Crusades had swallowed up almost six millions of men—contributed to the same result. Celibacy (obligatory since the time of pope Calixtus II., or the Council of Rheims, 1119, and the Lateran, 1123) and the institution of monks and nuns, with its innumerable offences[1] against the laws of chastity, only fed the flame of immorality. Moreover the imaginative life excited by the one-sided, spiritual tendency to faith and supersensible matters — a life which, as we know, strongly influences the sexual impulse, and even to-day produces erethitic female onanists, and brings about mystic marriages with Mary and Christ among those affected by ecclesiastical influences—was favorable to the same result. To this long catalogue must be added, finally, the general lack of occupation and unexampled indolence of the period, and we have certainly causes enough to explain the foundation of cloisters even for "converted" widows and "maidens", as well as the appearance of the religious orders of "Daughters of Magdalen" and "Penitential Sisters". The latter order was recruited from "the fallen", who not infrequently within its fold prosecuted only the more conveniently and with "more gusto" their lamented "fall". Besides these there were "itinerant wives and maidens", a female association, which at fairs and religious councils (there were 1400 of them in attendance at the Council of Constance) and on similar festive occasions sacrificed themselves at request upon the altar of love,[2] or as "schöne Frauen" furnished housekeepers for the clergy. The latter regarded these females as animated prophylactics, and "not as sources of pleasure, lest their superabundant substance might fall into corruption, whereby evil diseases would doubtless be increased among the honorable clergy"—an Arabico-Galenic theory which had numerous followers, and is still charitably believed by the housekeepers of the present day. Finally there arose at this time from the common street-prostitution the somewhat more respectable brothel-system. The inmates of these latter dark places even chose their regular female superintendent.[3] They were subject to the magistrate, or more frequently to the bishop (less commonly to the executioner), and formed often for the clergy, with the pope at their head, a favorite

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[1] I presume this refers to the prohibition of marriage among the clergy by pope Gregory VII. (Hildebrand) in 1064. (H.)

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1. On the site of an early monastery in Worms was found a whole collection of earthen vessels filled with the skeletons of children. In many places monasteries and nunneries were connected with each other by subterranean passages, designed to facilitate the spiritual influence of the respective inmates upon each other. The ultimate results were such collections of skeletons—unless these consequences were prevented by the timely use of the numerous remedies ad menstruum provocandum (abortives), quoted so frequently in the mediæval books on medicine, and certainly not designed for "the people". Doubtless their effect was anticipated by other prescriptions ad coitum provocandum. The monastic remedy for temptation of the flesh—to hold the index finger in the flame of a candle until the temptation was banished—could certainly be of little benefit to the females of the cloister, as the monks might hastily—blow out such flames of chastity. Then too the treatment smacked of homœopathy—to banish (internal) fire by the application of external! But historic justice demands the statement that the better clergy and the Councils strove continually against the general demoralization of the monks, nuns etc., though without stopping its source, the unnatural celibacy, which many of the popes certainly did not follow.
2. The terms were reasonable enough to suit the most parsimonious, viz: a package of bodkins (aiguillettes). The Latin designation for these housekeepers was "focariæ" (quæ focum curant, kitchen-maids). (H.)
3. They formed guilds similar to those of other occupations, and had their statutes and judges. (H.)

field for missionary labor and a fine source of income, as they were taxed one-tenth of their receipts.[1]

In London e. g. there were eighteen of these houses under the jurisdiction of the bishop of Winchester[2] In Nordlingen the authorities found it necessary to recommend to the reverend clergy that they should pursue their search for converts in the brothels rather by day than by night—an indiscreet official recommendation, which to-day at least seems no longer necessary. How very wide spread evils of this kind must have been is shown by the fact that such houses were considered at this time institutions of prophylaxis and were deemed just as indispensable as ordinary inns. In England (at this period mostly in a condition of semi-barbarity) the institution of brothels under episcopal supervision seems to have been in its prime, and to have been very carefully regulated. These houses had special signs, as "The Crane", "The Boar's Head" etc., and as early as 1162 certain "ancient" statutes were confirmed by act of Parliament, among which we find the following paragraphs:

1. "No host or hostess shall suffer a maiden to go out and come in at pleasure.

2. No such maiden shall be provided by the host with board and lodging out of the house.

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[1] Pope Sixtus IV. (1472–1484) is said to have licensed a brothel at Rome, the prostitutes of which paid him a weekly tax, amounting in course of a year to 20,000 ducats. (H.)

[2] At this period the solution of the prostitution question was in clerical (especially episcopal) hands, rather than in those of the medical profession, and it seems to have enjoyed in that day a very fruitful cultivation. (Baas.)

The brothels of London were situated on the Bankside, Southwark, and were visited weekly by the sheriff's officers. They were privileged by patent and regulated by statute from the reign of Henry II. (1162) until the last year of Henry VIII. (1547), when they were formally suppressed. The statutes quoted below are those of Henry II. In 1129 it was forbidden to grant licenses to the "Focariæ" in London. As late as 1321 an English cardinal purchased a brothel in London as an investment for sacerdotal funds! In France the barbers quite generally kept houses of assignation. The quarter assigned to prostitutes in Paris acquired the not inappropriate designation of "Clapier", but so common was it for them to reside over rooms occupied by students of law and medicine, that such a residence was regarded as prima facie evidence of the debauched character of the female occupants. Perhaps, however, the most damning evidence of the immense prevalence of prostitution during the Middle Ages may be found in the facts, that in 1179 an archbishop of Mayence, a man of extraordinary erudition for his day, was charged with supporting such a retinue of prostitutes that their maintenance entailed heavier expense upon his diocese than the charges of royal representation: that in 1190 the Danish peasantry joined the priesthood in opposing an ordinance of the bishops, which exacted the expulsion of concubines from religious houses, on the ground that the execution of the ordinance would endanger seriously the chastity of their own wives and daughters; that in 1291 the Knights Templar are said to have supported no less than 13000 prostitutes! It must not, however, be forgotten that the episcopal supervision of the question of prostitution was designed to regulate what was then (as often now) regarded as a necessary evil, and that the facts mentioned were abuses of an institution designed for beneficent purposes. They demonstrate forcibly the danger and impotence of ecclesiastical interference with a dirty subject at least. Whether other interference would be more successful is a question upon which doctors disagree. (H.)

3. The maiden shall pay for her apartment not more than fourteen pence per week.

4. On holidays no one shall be permitted to enter the house.

5. No maiden shall be forcibly detained in the house.

6. No host shall receive a female from ecclesiastical institutions, nor shall he receive a married woman. (What filth!)

7. No maiden shall receive pay from a man unless she has passed the *whole* night until morning with him.

8. No host shall keep a maiden who has the dangerous burning disease: nor shall he sell either bread, beer, meat or other victuals."

During and after the Crusades mankind began (so to speak) to get its eyes open, and heresy, mild and rare, indeed, but gradually acquiring strength, began to undermine the deceit of priests. In the Crusades were developed the germ-shoots of the seed of the Reformation, a development which the priests themselves saw, but could no longer repress by their opposition.

To medicine especially the Crusades[1] brought an extended field of activity, particularly in the innumerable hospitals founded as the result of these military expeditions, and over which the laity began to be appointed physicians. The disposition of the latter to investigation, and their practical impulses, received fresh nutriment in the new diseases resulting from the Crusades, as well as from an acquaintance with Byzantine and Arabian erudition and medicine, and their drugs and methods of treatment so different from those of the West. The great Hohenstaufer Frederick II., a "free-thinker", enlightened by the wisdom of the Orient, was especially active in the promotion of education, and above all in the elevation of the position of physicians. He paid no heed to the triple ban of pope Gregory IX. (1227–1241) — a freedom from prejudice unheard-of and wonderful in that day, and often lacking even in our rulers of the present time—partly, probably, because he had learned to exercise unprejudiced observation in his own occupation with the subjects of natural science.[2] By his promotion of medical studies and educational institutions he became a benefactor of mankind, and especially of Italy, the land of his love. Through his medical ordinance, published in 1224, he has secured for himself forever an honorable place in the history of medical culture.

Roger, king of Sicily, and grandfather of the emperor, had already before Frederick (as early as 1140) published an ordinance providing that the physician, before entering upon practice, must present himself to the civil magistrates and procure their permission, "in order that my subjects may not incur danger through the inexperience of the physicians". For violation of this ordinance the penalty of imprisonment and confiscation of goods was established. Frederick, however, completed and enlarged the whole. The tenor of the important ordinances of the latter prince is set forth in the following paragraphs:

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[1] Physicians, especially Jews, followed the crusading hosts.

[2] He wrote a treatise "De arte venandi cum avibus".

I. Of Physicians and Surgeons.

a. To practice in all branches of medicine (and surgery also), and to bear the title of a physician, was permitted only to him who had passed an examination at Salerno, and received the state-license from the emperor or his viceroy. Violators of the law were punished in money and goods, and received one year's imprisonment.

b. Before the physician was admitted to an examination, he must have attended lectures on logic for 3 years, and on medicine and surgery for 5 years, and must have practised under the direction of an experienced physician for one year.[1]

c. Physicians were examined on the genuine books of Hippocrates, Galen, and Avicenna.

d. The surgeon must, in like manner, bring evidence that he had attended the lectures of the professors, and pursued for one year the curriculum which surgeons hold necessary, especially human anatomy. Surgeons of the first class were examined by three professors, of whom one teacher of surgery conducted the examination in the Latin language, and in the presence of the prosyndic and prorector of the nation of the candidate. The diploma was subscribed by all these persons, accompanied by the attestation of a notary, and bore the seal of the Faculty. Surgeons of the second class were examined in Italian and by two teachers only, and the diploma was then subscribed by the two examiners alone. The candidates must take an oath never to treat internal diseases, and they could not receive the title of doctor.

e. The physician must give information of the fact if an apothecary sold adulterated drugs.

f. The physician must not be guilty of collusion with the apothecary as regards the price of drugs; still less might he keep a drug-store.

II. Tariff of Fees.

a. The poor must be treated gratuitously.

b. The physician must visit his patients at least twice each day, and, if requested by the latter, once also at night. For this he received, for every day of treatment:

α. In the city, or at his residence, . . half a tarenus = $0.14
β. Away from his residence, when
    1. The patient paid his travelling expenses, 3 tareni = $0.85
    2. The doctor " " " " 4 tareni = $1.17 [2]

III. Of Apothecaries, Druggists and their Tariff.

a. The druggists (confectionarii) must keep their drugs at their own cost, and in the prescribed method, which fact must be certified by physicians, and even confirmed by an oath. Contravention of this regulation was punished by sequestration of goods and by death.

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[1] I do not understand that this year of practice under the direction of an experienced physician was a condition for *examination*, but for a *license to practise independently*. The ordinance runs: "Nec tamen post completum quinquennium practicabit, nisi per integrum annum cum consilio experti medici practicetur." (H.)

[2] When we remember that at this period 9 eggs e. g. cost about one cent in the money of the present day, we may understand the high esteem which the profession of the physician must have enjoyed in that day — and may long for its return! Still more must this be the case if we accept the calculation of Daremberg, according to which the tarenus was a gold coin equal in value to half a Carolin, i. e. about $2.40.

b. The apothecaries (stationarii) in the first place, for such drugs and simples as were preserved commonly not longer than one year from the day of purchase, might demand 86 cents per ounce; secondly, for such as were preserved more than one year, they could demand $1.73 per ounce.

c. Apothecary-shops could be kept only at places designated throughout the kingdom.

IV. INSPECTORS—TEACHERS.

1. Two circumspect, worthy, sworn men, whose names are well known to the magistrates, shall be appointed, whose duty it shall be to testify that the electuaries, syrups and other preparations are prepared in conformity to the requirements of the law. This shall be done especially by the teachers of medicine at Salerno.

2. No person may teach medicine or surgery elsewhere than at Salerno or Naples, nor assume the title of teacher unless he has passed an examination before the teachers of the same branch of art, and before the magistrates.

V. PUBLIC HYGIENE.

The laws on this subject related to the adulteration of food and delicacies, the sale of poisons and love-potions, infection of the air by putrefying animal matters etc.

Spain received a similar medical ordinance about 1283, and Charles IV. (1347), in like manner, published such an one for the German States, to which that of Frederick served as a model.

Regulations relating to the practice of midwifery by physicians are, indeed, not contained in these laws, since the operative portion of that art, so far as it was practised in general by men, belonged to the department of the surgeon. Midwives, however, were not probably classed among medical persons.

That such wise ordinances (which certainly appear in many respects too strict to us of to-day, though we too enjoy some Draconian decrees—vaccination laws) effected a reformation in the study of medicine, and were especially calculated to rescue the medical profession from its mediæval ruin and decay, is readily apparent. Accordingly it should be gratefully recognized that Joanna of Naples confirmed them anew in 1365. Certainly they must at least have tended to this result, that clerical medicasters, without some medical knowledge, were less common.

Next to the influences already noticed, the founding of the Universities worked a further reformation in the sciences and intellectual life in general, as it did also in medicine. They were often causes of the reaction against the faith, though designed for its confirmation. The number of students became speedily very great, and they formed among themselves a kind of "community", which, like the communities among citizens, was designated Universitas. (Kriegk.) In the founding of universities too, that Frederick the Great of the Middle Ages and his chancellor Petrus de Vineis were of eminent service. The former called into being the universities of Pavia and Padua (1222), Naples and Messina (1224), which were undoubtedly preceded by those of Bologna (1110), Oxford,[1] Montpellier (1180),

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[1] As early as 872 there were three Halls founded by Alfred the Great in Oxford. University College, from the foundation of which the more modern writers reckon the founding of the University, was not established, however, until 1250. (Baas.)

The legend of the foundation of Oxford University by king Alfred is now and Paris (1205).[1] Bologna and Paris became the models for many of the later universities. These universities originated in voluntary associations; the medical departments in an association of physicians, from whose number those who desired to study medicine selected their teachers. It was also a question of guilds, whose statutes were then confirmed by the Church. At a later period the initiative in the founding of universities proceeded ordinarily from the sovereigns, who, however, were required to obtain permission for the erection of a university from the pope. This permission (often after long negotiations only) was granted by a bull. The universities received the power to manage their own affairs and other privileges, which formed the basis of university rights. Frederick, however, preserved to the state the absolute right to found such institutions and to grant them statutes, so that the universities through him began to pass into the control of the state.

The plan of instruction and organization of the universities of that period tended less to free investigation, than to the acquisition and illustration of existing knowledge. Thus philosophy was the leading study, and its standard bearers were Aristotle and the Arabians. Under the head of philosophy medicine was also included. In the latter, however, very few authors were admitted as authorities: in Paris e. g. Hippocrates (Aphorisms, Prognostics, "De victu in acutis"), Theophilus (De corporis humani fabrica), Joannitius and Ægidius of Corbeil; in other schools Galen and Avicenna also, as e. g. at Tübingen, where in 1481 the following curriculum was in force: First year: forenoon, Galen's "Ars medica"; afternoon, first and second sections of Avicenna's treatise on fever. Second year: forenoon, first book of Avicenna (anatomy and physiology); afternoon, ninth book of Rhazes (local pathology). Third year: forenoon, Aphorisms of Hippocrates; afternoon, Galen. As a text-book of surgery Avicenna or some other Arabian was used, although practical surgery e g. was almost entirely foreign to these authors. Besides the ordinary course of instruction, lectures were also given on Mesuë, Ægidius and Constantine Africanus. The professors of medicine were classed at the beginning among the teachers of the free arts, and required neither the approval of the state, nor a special examination for their position. Any one who had studied for three years, and had attained the age of 21, might act as a teacher. Of course he must, however, lecture first upon the preparatory branches, and was now called Baccalaureus. After three years' further study, he became a Magister in Physica, or doctor, though for the latter grade a further term of study

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pretty well exploded. We know, however, that a popular school existed in Oxford in the 12th century, and that in 1209 no less than 3000 professors and students withdrew to Cambridge and other schools, in consequence of dissatisfaction with the citizens of that town. In our modern parlance they "boycotted" the town of Oxford for five years. Merton College was founded in 1264, Baliol in 1263, and University College in 1253, yet the latter celebrated its alleged millenary in 1872! (H.)

[1] Even earlier than this Obizo (died 1138) and Hugo Physicus (died 1199) were clerical physicians in Paris under the reign of Louis VI., the Fat, and the latter physician was also a teacher there. (Baas.)

It is impossible to fix upon any definite year as the precise date of foundation of the universities of Bologna, Oxford, Montpellier and Paris. All of them were flourishing institutions in the 12th century. 1205 is the year in which the university of Paris received the papal privileges from pope Innocent III. (H.)

of six years, as well as a double public and private examination, was required. After this the teacher was for the first time permitted to practise, in contrast to our custom, where the venia practicandi precedes the venia legendi. What kind of persons some of these teachers were may be judged from the following extract: "They make a great show of Hippocrates and Galen, bring forward strange words, quote their aphorisms on all possible occasions, and daze the minds of men as if they were struck by a thunderbolt. They are believed to be able to do everything, because they boast of everything and promise everything. . . Those boys of yesterday are to-day Magistri: they who yesterday felt the rod, to-day, clad in the stola, teach from the rostrum". Many very excellent translations of the ancient authors proceeded from the universities of this period; the labor lavished by them upon the Arabian writers deserves, however, less praise. They clung slavishly to the Ancients, and even as late as 1603 the Faculty of Paris strongly inculcated the importance of varying in no respect from the doctrines of Hippocrates and Galen.

These first universities were followed in the course of the Middle Ages by numerous others, which on the whole (like culture in general) advanced from south to north, and almost everywhere occupied the most charming sites. Their organizations differed little from each other, and their libraries, gradually increasing, constituted a new leaven working likewise upon medicine. Among these later universities were those of Toulouse 1229, Salamanca 1243, Lisbon (Coimbra) 1287, Heidelberg 1386, Cracow 1364, Prague 1348 (in 1883 the medical Faculty was divided into a German and a Czech branch), Vienna 1365, Fünfkirchen 1382, Culm 1387, Cologne 1388, Erfurt 1392, Würzburg 1403, Leipzig 1409, Rostock 1419, Louvain 1426, Greifswald 1456, Freiburg in Baden 1457 (occupying the most charming situation of any of the German universities, founded at the instance of the archduchess Matilda by her husband Albrecht), Basel 1460, Ofen 1465 (erected by John of Pannonia, by command of Matthew Corvinus; from this period until 1848 Latin was the language of the court and the state), Ingolstadt 1472, Munich and Treves 1472, Tübingen, Mayence and Upsala 1477, and Gratz 1486.

If the universities of the Middle Ages for the most part served merely as institutions of instruction, and developed no productive activity in the department of mind; if they were, indeed, in many respects rather a check upon intellectual activity, yet they still promoted the advancement of medicine, since within their walls this science gained once more a scientific position and place of refuge. That the course of instruction was stereotyped in form, and carefully watched over by the Church and subsequently by the state, must, indeed, be regarded as a limitation of free development; that, however, the study in these universities gave by its honors a certain higher social position in life; finally that medicine once more fell into the hands of thinkers (albeit of false thinkers in many respects when compared with our present standpoint of knowledge), while up to this time it had for its guardians for the most part mere empirics and ignorant clergy — these were certainly unquestionable advantages.

These false modes of thought (yet genuine thought instead of the pure faith heretofore dominant) were introduced by the so-called scholastic philosophy. This philosophy was originally designed — an impossible task — merely to establish ecclesiastical doctrine on the basis of reason, or rather to harmonize it with the ancient philosophy, particularly that of Aristotle, and thus to bring higher thought also into the service of theology. But alas, the subtilties necessarily resulting from such an expectation speedily acquired an influence upon all other sciences. Scholasticism, in spite of the prodigious erudition which it awakened, was substantially nothing but a one-sided and deplorable wandering in the labyrinth of the most hairsplitting dialectics, where, however, undoubtedly great intellectual power and versatility were united in activity with an industry often wonderful. The Arabians furnished its impulse and its models, and their method of philosophizing the scholastic philosophy continued in the West and transferred to Christian theology and the sciences, in which the same philosophers were regarded as the masters. It matured the first skeptics, and thus laid the foundation of intellectual advancement in opposition to the will of the Church.

The founders of this school of philosophy were Johannes Scotus Erigena (died 879), who affirmed that all authority came from reason, but reason never from authority, and Gerbert (afterwards pope Sylvester II., died 1003). After an acquaintance had been formed with the writings of Aristotle and his Arabian interpreters, by means of the Jews, who possessed flourishing schools from Toledo to Metz, Lanfranc (1005–1089) and Anselm of Canterbury (1035-1109), both of whom were bishops of the last named see under William, the Conqueror, became above all others important promoters of the scholastic philosopy. Alexander of Hales (died 1245) possessed the whole of Aristotle, and was the first to make philosophy subservient to theology, a thing which had not been done by the generality of the earlier scholastics. What subjects some of these scholastic philosophers selected for the exercise of their "acuteness" may be inferred from the example of Petrus Lombardus (died 1164), bishop of Paris, who excogitated whether in Paradise the bowels moved, and how many angels could comfortably dance upon the point of a needle!

With the name of Anselm is associated the founding of the philosophical sect of "Realists", who taught that an object and its conception were one and the same thing and originated at the same time, while their opponents, the "Nominalists", whose leader was the monk Roscellinus (end of the 11th century; he taught that three names, but not three persons, were to be found in the Trinity) affirmed that conceptions were obtained solely from existing objects, and that the perception must precede conception. Both fought like philosophical boxers until the latter succumbed. The most famous champion of Realism, who considered doubt profitable, since it leads to the proving of the truth, was Pierre Abelard of Palet near Nantes (1079–1142), famous for his amour with Heloise (1105–1164), which finally occasioned his castration by his inhuman enemies.

Similar intellectual polemics, which, indeed, often degenerated into bloody measures, gave birth later to the sects of "Thomists" and "Scotists", the former belonging to the Dominican, the latter to the Franciscan order, and so called after their leaders, Thomas Aquinas (1224–1274), author of 28 quartos, and Duns (Dunstan) Scotus (died 1308, wrote 12 stout folios). What was the nature and the subjects of the philosophical wrangles of both parties may be judged e. g. from the fact that the Immaculate (though incredible) Conception furnished for them so inexhaustible a subject, that each week in Paris a Scotist stood ready for the tongue-lashing and word-playing, a whole day through, without either eating or drinking! The fanatically pious St. Bernard of Clairvaux (1091-1153) opposed the subtilties of both these earlier parties. After his death his fancies, united with dialectics, were developed into a peculiar kind of Christian "Neo Platonism" (taught especially in the school of the monastery of St. Victoire at Paris), to which Thomas à Kempis (1380-1471) and the earlier Johann Tauler (1290-1361) of Strassburg, subscribed. Besides this there existed at the same period still another, if possible even more fatal, amalgamation viz. that of scholastic dialectics with poetical mysticism, which Bonaventura (died 1247), the so-called "Dr. Angelicus", introduced. According to him temporal and eternal existence lay in the doubled three, and the unity tending thereto. The lower life has three grades; the higher, the same. The number 7, which unites the three and contains the unity, has, however no corresponding condition, and is therefore God himself.

To the indirect advantage supplied to medicine by the revival of thought, as such, through the scholastic philosophy, must still be added the translations and explanations of the old Greek medical writers (especially Hippocrates and Galen) and the Arabians effected by its sectaries. On the other hand the fashion of hair-splitting dialectics, transferred also into medicine, and thoroughly perfected by the "Authorities", was most pernicious. The unhappy kindred efforts which manifested their influence in medicine as the result of the mystic bent of individual scholastics, and which found their expression in astrological and other superstitious opinions and procedures, and prevailed too, as we have seen, among the later physicians of Antiquity and the Arabians, tended to the same unfortunate conclusion.

The scholastic philosophy now ruled, with, indeed, a gradually decreasing power, and in a more or less distinctly marked proportion, the different departments of medical literature to the end of the Middle Ages, and even into modern times. Naturally its leadership affected least those branches founded chiefly upon experience, observation and matters of fact—I refer to anatomy and surgery, the separate and independent cultivation of which was to give at last the death-blow to the medicine of faith, in order to break an unobstructed way for the medicine of observation.

4. THE CHRISTIAN PHILOSOPHICAL PERIOD OF MEDICINE. SCHOLASTICS. TRANSLATORS AND SCHOLASTIC ELABORATORS OF GREEK AND ARABIAN WORKS, AND INDEPENDENT WRITERS IN THE DEPARTMENTS OF INTERNAL MEDICINE, ANATOMY, SURGERY, PHARMACOLOGY PHARMACY AND VETERINARY MEDICINE.

Pagan medicine began, as we know, in faith, or rather in theurgic superstition, and finally became a philosophical science. The same statement holds true with regard to the Christian medicine of the Middle Ages, which, indeed, had to begin a new course in the development of humanity. Its philosophical phase extended through the scholastic period, and here too (in opposition to the religious phase) it represents a real advance, while the succession of the two phases must be regarded as one of the historical proofs that mediæval medicine in general belongs to a progressive development; that it represents no halt nor retrograde movement, as the common idea (which ever regards the ancient medicine simply) runs. This is, however, a false standpoint, for mediæval medicine was not, and did not remain, simply the medicine of the Ancients, but began, combined with popular medicine and clerical medicine (which differs little therefrom), a new phase of development, with which, of course, important parts of the ancient medicine were combined. New and old, indeed, in every metamorphosis of civilization, join hands ever with each other.

The long line of medical authors in the last half of the Middle Ages, who directly or indirectly felt the influence of these scholastico-philosophical views, contains (with the exception of a very few writers who belong to the last period of this division) such writers only as busied themselves with translations, explanations and the elaboration of the old-Greek and Arabian physicians. They cherished the views of both as though they were a Gospel, in which one might change, and to which one might add, nothing whatsoever; which one ought only to learn to understand and to explain.

The spirit of the age, which still clung to by-gone faith and superstition, furnished the inevitable mystic, astrological, alchemistic, chiromantic and fraudulent ingredients. On the other hand this epoch matured a few harbingers of the future phase of reflective observation; for the present ever conceals the germs of the future.

The adherents of the Greeks were the earlier; those of the Arabians followed at a later period. From the mass of authors of both nations, however, a few only were used as guides for these authority-mad times; at first Hippocrates, Galen, Dioscorides and Aristotle; subsequently Avicenna, Averroës, Mesuë and Rhazes. But, even among the works of the authors just mentioned, a few only were subjected to criticism. Accordingly there were Grecists and Arabists, and besides these a middle party, the so-called Conciliators. There was also an opposition party, small in numbers, and composed of opponents less in word and writing, or *ex professo*, than *de facto*, in the manner and the result of their investigations.

Some of the individuals to be mentioned here belong rather to the department of philosophy than to that of medicine (which latter science, however, was considered a branch of philosophy), with the subjects of which they busied themselves only incidentally. They exercised, however, great influence upon the development of the natural sciences, to whose elaboration and reëstablishment they unquestionably gave the impulse. Through their labors the 13th century became the century of birth of the modern investigation of nature. The chief scholastics were men who desired to investigate the whole world, the visible as well as the invisible. At the head of these

a. Philosophical Students of the Natural Sciences and Medicine

belongs one of the greatest thinkers and savants of all time, a mediæval "coadjutor of Aristotle, Leibnitz, Haller and Alex. von Humboldt, and a man beatified" in spite of the Catholic Church,

ALBERT VON BOLLSTÄDT, of Lauingen in Suabia,
better known as Albertus Magnus (1193–1280). His collected works (in which many of his writings are wanting) fill 21 quarto volumes — all considerable scholastics wrote with amazing fecundity — and among them his "De animalibus" discusses anatomical and physiological questions. In his commentary on the "Textus sententiarum" of Petrus Lombardus he discusses — evidence of an age which squandered its acuteness on vain and paltry subjects — the question whether Adam, in the removal of the rib out of which Eve was formed, really experienced pain, and whether, at the day of judgment, that loss of a rib would be compensated by the gift of another. In consequence of his knowledge of physics and mechanics — he is credited with the construction of automata and speaking heads — he was in his day regarded as a sorcerer. Albert made a great number of experiments in these branches, and was such an enthusiast in natural science that he even interwove it in his treatise "On the Virgin Mary". He discussed botany (from the standpoint of practical agriculture), chemistry, physiology (insensible transpiration etc.), astronomy, magnetism (polarity of the magnet), the capacity of animals and plants to adapt themselves to climate, environment etc., falconry, as well as the doctrine of cognition etc. His pupil, Henricus de Saxonia, composed a secular work entitled "De secretis mulierum", very often printed even as late as the 17th century.

Even before Albert von Bollstädt his fellow-monk (Dominican)

VINCENT DE BEAUVAIS (died about 1264), the "Pliny of the Middle Ages",
in his work entitled "Speculum Majus" (much of which is borrowed from the "Quæstiones naturales" of L. Annæus Seneca), supplied an encyclopædia which included a manual of popular medicine and remarkable intimations of the polarity of the magnetic needle. He, together with the older

HUGO DE ST. VICTOIRE (died 1140),
assumes a reasonable and a vegetable soul, the first of which as a fiery vapor ascends from the heart to the brain.

Pupils of Albert were also:

THOMAS DE CANTIMPRÉ (1201–1270),
a professor in Louvain, who, in his compendium, entitled "De naturis rerum", mentions cephalic version, and

THOMAS AQUINAS (1225 or 1227–1274).

In his "Summa totius theologiæ" the latter employed medical matters as collateral proof of his subject. He held the heart to be the source of all motion. The form and powers of the organs were entirely independent of each other; yet the soul was a form not accidental to the body, but substantially united with it This form was created anew in each conception, though not from the semen, which contains a formative principle alone, conveyed to the uterus and passing over into the embryo. For the generation of an individual, moisture, heat and æther alone are necessary; hence animals originate even from putrefying matters.

What intellectual power existed too in these times, under all the superstition and the subtilties of the age, is shown by the example of the English Franciscan and "Dr. Mirabilis",

ROGER BACON (1214–1292 or 1298),
who, surrounded by such hindrances and by an unbounded faith in authority, insisted upon independent thought, "precision" (the modern idea), observation, measurement

and calculation as the means to clearer knowledge. Accordingly he was by some accused of rank heresy, though in fact he was simply an opponent of scholasticism. But, as the first and chief skeptic and realist in our modern sense of the terms (and he showed himself to be this in some particulars at least), he was looked upon by his contemporaries as in league with the devil, and by posterity as a herald of the modern spirit. On the other hand his merits have been by some too highly extolled. He was acquainted with the telescope, lenses[1] (he called attention to their usefulness for old people, and ascribed their action to the fact that objects were seen under a greater angle), microscopes, the burning-glass and camera, but their invention belongs most probably not to Bacon, but to the Arabians. At least they were some of them known to Al Hazen in the 11th century, and as Bacon understood Arabic, Hebrew, Greek and Latin, he may have made use of the works of the latter. Talking-machines (ascribed also to Albert von Bollstädt), gun-powder and flying machines he certainly did not invent. His principles, his freedom from prejudice, his zeal for practical aims and his experimental method, however, secure to Bacon an imperishable place in the history of the development of the natural sciences, chemistry, physics, mechanics and mathematics (which he was one of the first to adopt from the Arabians and to transplant into the West), and secondarily they merit honorable mention also in medicine. On the other hand his astrological superstition, which led him to believe in the influence of the stars on therapeutic measures like bleeding and the use of laxatives, his search after a universal remedy, and his speculations over the question whether barley-water, a substance, could cure fever, an accident, — all these must be charged to his time. Through the machinations of the monks, who began at this time to display their mischievous activity, Bacon was accused of heresy, and even imprisoned many years as a person dangerous to the faith. For in this century the religious orders, through that centralization which the later Jesuits adopted, had acquired still greater power than that attained in the 11th century by their separation from the ecclesiastical and political authorities. This separation was attained by "greasing" the popes — a process to which the latter were by no means averse! Bacon's chief work was entitled "Opus majus de utilitate scientiarum". Half a century later Nicolaus de Autricaria (d' Audicours), also a materialist and atomic philosopher in Paris, a city still devoted absolutely to the faith, was compelled to recant, among other things, the maxim "that in natural processes nothing is active save the motion of union and separation of the atoms". (Lange.)

Among the scholastic encyclopaedias belongs also the "Livres dou Tresor" of **Brunetto Latini** (1220–1295), the teacher of Dante.

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[1] At this time (1285) the first glasses were ground for optical purposes, spectacles and simple magnifying glasses, by Salvino degli Armati (died 1317). This was the foundation of our modern astronomy, photography, spectrum-analysis, microscopy etc., and one of the most important inventions in regard to civilization which has ever been made. Alexander della Spina (died 1313), a monk of Pisa, is also associated with the invention of spectacles, an invention which is said to have withdrawn a large portion of the diseases of the eye from treatment in the apothecary-shops. At a still earlier period Seneca had seen letters magnified by means of glass globules filled with water (just such as are used by cobblers to-day to improve their light). In a picture by Jan van Eyck, 1436, a cleric is seen with a sort of eye-glass in his hand for reading. We do not know the name of the inventor of rag-paper, which appeared in the West about the same time, and must have rendered printing, with all its unforeseen results to civilization, if not possible, at least powerful in its agencies. Probably both inventions were of Chinese origin. The first glass mirror is mentioned in 1279.

b. Laborers on Pathological and Therapeutical Subjects.

Were the conclusion admissible that the inner state and intrinsic worth of medicine at any particular period are always proportioned to the number of its medical authors, and not (which is alone the correct inference) that a great number of authors points only to an excessive number of physicians existing at any definite time, we should conclude that in the Scholastic epoch the healing art found itself in an internal condition so flourishing as happened to it at few other periods. Nothing, however, is less the fact! On the contrary we may affirm that, in general, medicine had at no other period possessed so little intrinsic, productive value as at this time. An interesting comparison may be drawn between this and the Alexandrian period.[1] In both the treatment and elaboration of existing materials, commentaries upon the earlier physicians, occupied the chief position in medical art; in both two groups of physicians must be distinguished, though the Grecists and Arabists, more distinct in their periods, did not exist beside each other. We find in both the overgrown rule of the subtilties of dialectics; in both Aristotle was the leader of philosophy; in both therapeutics and materia medica were especially cultivated, beside an erudition often perfectly astonishing, together with astrological and other superstitions. At bottom, an advance in anatomy and surgery only, this time, however, destined to be permanent, because an outgrowth of the spirit of the masses, and not of individual rulers. Both epochs too were of almost equal duration, only during the Alexandrian period more currents of thought ran beside each other. It is striking also that during this period Germany did not at any time exercise any considerable influence upon medical culture, and was even almost without medical representatives — at all events without any of considerable importance — so that the Roman nations ruled medicine without interruption, a condition which remained substantially unchanged until the following century.

a. TWELFTH AND THIRTEENTH CENTURIES.

With the 12th century begins the "Age of the Arabists", who followed the Arabians in science and practice, and whose influence continued active down into the 17th century. The earliest among the considerable authors of this period (he was a contemporary of Frederick Barbarossa, 1152–1190) was **Gerhard of Cremona** (1114–1187), a scion of the school of Salerno, who translated chiefly the writings of Hippocrates, but also many Arabian physicians and the whole of Galen. He had, like many of the very numerous and zealous translators of the time who travelled extensively, betaken himself in the first place to Spain (at this period raised by the labors of the Arabians to the position of the lauded land of the sciences and the Mecca of numerous savants and students), and particularly to Toledo, where he continued to reside until his death.

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[1] The Alexandrian epoch, however, was a descending, the Scholastic an ascending epoch, and the latter, therefore, manifested very many progressive acquisitions in the scientific, religious, artistic and material departments. We may mention the growth of religious criticism (Waldenses); the progressive development of states and associations; the discontinuance of all slavery from the 13th century, to be replaced by simple vassalage; the founding of cities; the decline of chivalry; the gradual development of the arts, some of which e. g. music (which began to revive in the 11th and 12th centuries), architecture, painting etc., had entirely disappeared since the days of Antiquity; commerce and colonization (Hanseatic league), which, like the arts, proceeded from Italy; banking, which originated in the same country, and during the 13th century spread also to the North; the growth of trades (guilds) among the citizens; the beginning of travels for learning and discovery (Marco Polo died 1251), etc.

The Aphorisms of Hippocrates and the writings of Galen were better translated by **Burgundio of Pisa** (died 1194), a lawyer.

A famous teacher at Bologna after 1260 was **Thaddæus of Florence** (1215–1295), who united philosophy and medicine with a display of all scholastic and Arabian erudition, and translated and explained the Hippocratic writings especially, besides those of Galen. He also wrote a treatise entitled "De regimine sanitatis secundum quatuor anni partes". Although the Bolognese had relieved him of all taxes, he yet made himself notorious by his costly treatment and his covetousness.

The Jew **Ferragius** (Ferraguth, Farradsch ben Salem) of Agrigentum, in the 13th century acquired some dubious credit by his translations of the Arabian physicians, who were so highly esteemed that Charles of Anjou (1266–1285) procured a copy of the "Continens" of Rhazes from the bey of Tunis by means of a special embassy. It was through the agency of the school of Salerno that the writings of the Arabians were first made known to the West.

The famous **Peter of Abano** near Padua (lived 1250–1320), a man of refined views, though given to superstition of all kinds, was a master of the speculation and erudition of the times. Persecuted for his heresy originating in his devotion to the writings of Ebn Roschd, he was, on the other hand, equally admired, especially for his knowledge of Greek acquired at Constantinople and in Greece. He lived a long time at the university of Padua, after having studied medicine and mathematics during his educational travels and in Paris. His writings — proof of the estimation in which their author was held — were among the first impressions of the 15th century.[1] His "Conciliator" in its very title expresses his mediation between the Arabists and the Grecists. The scholastic method of questions and answers, followed by an expression of his own views, is also his, and the questions themselves are subtle speculations, e. g. whether air is by nature cold or hot, whether pain is a disease or an accident, whether heat and pneuma are one and the same thing, whether a small head is better than a large one etc. (Smallness of the head from narrowness of the skull is pernicious; from a deficiency in the thickness of its covering it is, however, very good!). Critical days he ascribes to the influence of the moon; considers venesection especially beneficial in the second quarter of the moon; iron is the most serviceable material for instruments in consequence of its relation to Mars, and of the latter god to surgery. In the latter science he commends the "dry method" in the treatment of ulcers, recommends bronchotomy, but desires to limit the use of paracentesis abdominis.

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[1] The "Conciliator differentiarum philosophorum et precipue medicorum" was first published at Venice in 1471. Peter was aware that the air possessed weight, and he calculated the duration of the year at 365 days, 6 hours and 4 minutes. He calls the brain the source of the nerves, the heart the source of all the vessels etc. (H.)

During the same period lived a second Peter (he died 1277), known as the Spaniard,

son of a physician Julian, and afterwards pope under the name of John XXI. He wrote a "Thesaurus pauperum", in which he, indeed, discards the charms of the monks, but is of the opinion that one may keep free of epilepsy if he suspends about him Sts. Caspar, Melchior and Balthasar, i. e. their names written on a scrap of paper. Finally he believes that diarrhœa may be excited by packing fæces of the patient in hollow human bones and laying the latter in a river. As long as these lie in the stream the abdominal flux will continue.

Among German physicians of this period (in which family names were either not used, or employed only exceptionally) we may mention:

MAGISTER HENRICUS, physicus in Ruspach 1226;

RUPERTUS MEDICUS, physicus 1248;

MAGISTER HERMANNUS, physicus in Bamberg 1248;

MAGISTER JOHANNES, physicus,

whose known life falls between 1236 and 1249, and who was ordinary physician of the bishops Brunward and William of Schwerin:

MAGISTER HERMANNUS

was chosen city physician of Wismar in 1281; besides these we may notice:

OTHO, medicus in Nuremberg, and a Jewish physician, JOSEPH, of the same city;
MAGISTER ANDREAS, (died 1295), physicus in Wimpfen, and
MAGISTER BERTHOLDUS (died 1295), of the same place.

These names at least furnish evidence that in Germany then, and even before this time, medicine occupied a recognized position, and, above all, was held in esteem.

β. THE FOURTEENTH CENTURY

introduced with power and energy the mighty leaven of a more modern period into both social and intellectual life. In regard to both we must emphasize the fact that commerce,[1] business and manufactures, as well as the higher arts, took a lively start, particularly in Italy. Dante (1265-1320; by the bye he was a member of the guild of physicians and apothecaries) had produced his "Divina Commedia", and this was the century of Petrarch and Boccaccio! In Germany, on the other hand, the Hanseatic league was in its bloom, and, for the first time, coined money came into common use as a convenient medium of exchange, facilitating commerce and stimulating production which had hitherto languished under an almost exclusive system of barter. But increased prosperity favored intellectual mobility and mental effort. Progress in the sphere of religion had been, indeed, invoked by individuals in the preceding century, but mainly in secret: now, however, it appeared in the definite shape, and upon the open road, of anti-papal

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1. In Florence e. g. 15 millions of guilders changed hands annually in the wool business. The invention of the compass (according to accounts by Flavio Gioja of Amalfi in 1300) was a powerful agent of civilization which we owe to the close of the Middle Ages, so rich in great discoveries.

sectarianism (Wickliffites).[1] It shook the infallibility of the pope (with which human reason is to-day once more offended!), and insisted upon an improved education, whose higher departments Scholasticism was, however, still for a long time to control, though Petrarch and other heralds of the great Humanists of the following century fought against it with all firmness. Astrology, theosophy, miracle-working and clerical quackery likewise still walked openly in the light of day, while alchemy was cultivated in secret. Yet from the latter art the elements of chemistry began to develop, as the natural sciences in general began at this time to spread abroad. Kunrat von Megenberg (1307–1374) composed his "Buch der Natur", the pioneer natural history in the German language. The remarkable invention of gunpowder by Berthold Schwartz (1330), so important in the history of civilization, reformed surgery. The French demonstrated their intellectual independence particularly by genuine national historical writings and poetry (troubadours), while such essays among the Germans (of course for the second time, but with greater success than in the times of the city chroniclers and minnesingers and meistersingers of the 13th and 14th centuries) did not appear with any prominence until the 16th century. The sciences accessory to medicine, and its fundamental branches, arose, and moreover the revival of human practical anatomy as an openly recognized department of medical science makes this century imperishable in the annals of medicine.

The most famous among the scholastic physicians of this period, a man, indeed, distinguished among the "Conciliators" by the title of "Plus quam commentator", was the pupil of Thaddæus,

TORRIGIANO RUSTICHELLI, a teacher at Paris, between 1306–1311.

The commentary of this Carthusian monk on Galen's "Ars parva" brought him the title mentioned above, and helped him to a place in the curriculum of the universities of the day. In many points he deviates from Aristotle, Galen and Avicenna, e. g. in accepting the seat of sensation in the brain (instead of the heart), the identity of the nerves of sensation and motion etc.

To this epoch also belongs

MATTHEW SYLVATICUS of Mantua (died 1342; probably the Salernian Mazzeo di Montagno, whom Boccaccio mentions on the occasion of a case of anæsthesia of the lover of the old man's young wife),

who was for a long time an active practitioner in Milan, and, in like manner, desired to mediate between the Arabians and the Greeks. On the other hand the cardinal

VITALIS DUFOUR (DE FURNO, died 1327)

composed an alphabetic compilation, after the style of the Arabians and Arabists, entitled "Pro conservanda sanitate" etc. In the same year with him died

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[1] Physicians also took part, as pioneers of Luther, in the efforts for reformation of the church. The most influential of these was Marsilius of Padua, who was for 18 years ordinary physician of the emperor Lewis of Bavaria and author of the "Defensor pacis", which has been called "the creed of the anti-papal party". Physicians have ever stood in the foreground wherever there has been a question of intellectual progress!

Dinus a Garbo of Florence,
who wrote subtle commentaries on the treatises of Avicenna and Hippocrates on generation and the nature of the embryo, in which he investigates whether the semen originates from the heart only of the father, or from his whole body; whether intelligence resides in it etc.

Nicholas of Reggio (about 1330)
again translated the whole of Galen,[1] while

Francesco of Piedmont (about 1330), near Naples,
explained the Arabian Mesuë. He recommended the Psalms of David as a kind of ergot for facilitating difficult labor, is acquainted also with cephalic version, knows of the occurrence of superfœtation, and administers serpents internally in small-pox. Similar curious counsels are given by

Gentilis of Fuligno,[2]
in his day a highly famed and devoted professor at Padua, who died of the plague at Perugia in 1348. He composed some "Consilia" and commentaries on the Arabians and Galen. He is said to have been the first to observe gall-stones.

Thomas a Garbo (died 1370), the son of Dinus,
wrote on the same book of Avicenna as his father. A famous teacher at Perugia and Padua, he merited the praise of Petrarch (1304–1374), who, though a sworn *enemy* of the physicians of his time and of their medicine in general, yet, in his fiery opposition to blind faith in authority and to hollow dialectics, promoted this science indirectly, and should accordingly be mentioned here as a "herald of the strife". His idea that the destruction of the common man by the physicians, is not much to be lamented, however, does not exhibit him in a very estimable light.

To this century belongs also the medical family of **Santa Sofia**; at the beginning of the century, **Nicolo Santa Sofia**, professor at Padua; then his sons **Marsilio** and **Giovanni**, the former professor at Bologna, the latter at Padua; and at the end of the century (1388) **Galeazzo**, professor at Vienna and Bologna. They wrote on practical subjects with some commentaries.

Another commentator on the Arabian Mesuë, was **Christophorus de Honestis** (died 1392) of Bologna, where, as well as at Florence, he was a professor.

Among the German clerical physicians of this century belong:

Magister Thomas of Breslau, bishop i. p. of Sarepta, the earnest opponent of uroscopy and astrology, and

Sigmund Albicus (born 1347) of Moravia, both of whom were followers of Arnold of Villanova.

γ. The Fifteenth Century.

Were we discussing the history of world-moving inventions, we should mention here, before all others, that of printing, 1450,[3] by Joh. Gänsfleisch.

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[1] From a MS. sent to king Robert I. of Sicily, by the Byzantine emperor Adronicus. (H.)

[2] Steinschneider designates by the title "Pseudo-Gentilis" a physician, Bernard Alberti, dean of Montpellier, to whom he ascribes the "Recepta" which pass under the name of Gentilis.

[3] The first impressions (42 line Bible) appeared in Mayence in 1455 or 1456. The art extended very rapidly throughout Germany, France and Italy etc. The presses at first supported themselves by religious and theological (scholastic) writings; subsequently by humanistic, and still later by those relating to the-

called Gutenberg, 1397–1467, of Mayence) — that German achievement of the fifteenth century, which produced such incalculable blessings for the intellectual life of all people. Moreover we should recall as its antipode in the history of civilization the introduction of firearms into the West.[1] If, however, we desired to write a general history of civilization, or even simply an introduction to the imperishable work of the greatest of German heroes — the Reformation — we should be compelled to discuss in detail the life and labors of those great Humanists who gave to this century its spiritual consecration and its zeal. We should speak of a Georgius Gemistus Pletho (1355–1452), of a cardinal Bessarion (1395–1472), a George of Trebizond (1396–1486), Demetrius of Crete, Demetrius Chalcondyles (1424–1511), Callinicus, Joh. Argyropulus (died 1486); of those Platonic philosophers like Marsilius Ficinus (1433–1499), the Germans Nicholas Cusanus (1401–1464) of Cusa on the Moselle, Conrad Celtes (Conrad Pickel of Wipfeld, 1459–1508), and Rudolph Agricola (properly Rud. Baumann of Wasserburg, 1442–1485), and finally the noble martyr Huss, and many other equally

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Reformation. Printer, publisher and bookseller were originally all united in the same person. The printers, and particularly the proof-readers, were often persons of learning. It was not until the beginning of the 16th century that publishers proper arose, who employed printers and agents (Sartimenter) in all large places of every land, in order to facilitate the sale of the books. Originally the Latin language, as the cosmopolitan tongue, was employed, and it was not until the 16th century that books began to be divided more and more according to national languages. Of course the fabrication of paper was greatly increased by the invention of printing, but its price fell in consequence of overproduction. In 1484 twenty books cost only about $2 50, and at the turn of the century 200 books were purchased for $3.60. Woodcuts and decorative printing were speedily introduced. The booksellers' emporium was Frankfort-on-the-Main until the middle of the 18th century, when Leipsic developed into headquarters of the publishing business. (Oscar Hase, 1886.) (Baas.)

The first book printed in the English language was a translation of "Le Recueil des Histoires de Troyes", set up and printed at Cologne in 1471 by William Caxton. Soon after Caxton erected his press in the monastery of Westminster Abbey, where in 1474 appeared his "Game and Playe of the Chesse", which is believed to be the first book printed with the date in England. Printing is believed to have been introduced to the western continent by the Spaniards as early as 1535. At all events the "Manual de Adultos" appeared from the press of Juan Cromberger in Mexico in 1540. The first press within the limits of the present United States was set up in the house of Rev. Henry Dunster, president of Harvard College, at Cambridge, in 1639. It was placed in charge of Stephen Daye, and the first work issued was "The Freeman's Oath", followed by "An Almanack" in the same year. This press was the lineal ancestor of the present famous "University Press". The "Bay Psalm Book", a metrical version of the Psalms of David printed by Daye in 1640, was the first book proper printed in the U. S. A copy of this work in the "Lenox Library", New York, is reported to have cost $400. (H.)

[1] The first fire-arms were manufactured in Augsburg in 1381. (This must refer to small-arms, for it is well established that cannon were employed by the English under Edward III. at the battle of Crecy in 1346. (H.)

great men! Were we writing a history of the arts, we should mention here the greatest names of all time. For painting and architecture, music, so long undeveloped (especially among the Netherlanders), wood-engraving, wood-carving, art-work, goldsmithing, ceramics (majolica) etc., celebrated, as we know, high triumphs in this century, and, indeed, this epoch comprehended or engendered the greatest geniuses who have ever lived in the service of the Beautiful! Mathematical science was advanced by such men as G. Peurbach (1423–1461; introduced the Arabic or Indian figures and the decimal system); Martin Beheim (about 1449–1507), a mathematician, geographer and navigator; Joh. Müller (Regiomontanus, 1436–1476) of Königsberg in Franconia, author of the first German almanac, and of the ephemerides which rendered possible the voyage and geographical discoveries of Christopher Columbus (1456–1506); historical composition was represented, among others, by Joh. Turmair, surnamed Aventinus (1477–1534, son of an inn-keeper, and pupil of Celtes, the son of a wine-grower), not to mention numerous others. The natural sciences were likewise promoted by travels, though the latter were undertaken solely with the object of palpable profit, like the earlier travels of Marco Polo. But self-interest worked involuntarily in the service of the lofty spirit of the time. The Orient was the scene of the travels of the Nuremberg patrician Schillberger, of the great Breidenbach expedition (1483-84) and others; on the ever memorable 12th of October, 1492, Columbus discovered a new world, and five years later Vasco da Gama (1469–1524) opened a new route to the Indies. In a history of medical culture these deeds must be at least pointed out, and these men mentioned, if only cursorily. Of course we can only refer to the historical foundations of the history of medical development, without thoroughly discussing them; otherwise we should far transgress the limit of simple "Outlines". But, by means of these acquisitions, medicine too received, directly and indirectly, in this period the mighty impulse which led it forth out of the wilderness of the Middle Ages and the sway of Galen and the Arabians, though here, alas, it worked with far less energy than in the emancipation of the other sciences. Besides the renewed study of the Ancients, the appearance of new epidemics, in which physicians could not pursue the treatment of Galen and the Arabians, but must perforce stand upon their own feet, had also its influence upon medicine. Still astrology, Neo-Platonic mysticism and kindred parasites on the pure body of science, especially in its practical portions, maintained, on the whole, their open and secret dominion. Thus even the great Ficinus[1] (1433-

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[1] Ficinus wrote a book entitled "De studiosorum valetudine tuenda", of which Hæser says "Das buch des lebens zu tütsch gemacht durch Joh. Adelphi, 1505" is a German translation. He adds that the book was published "sine loco". Since a Joh. Adelphus, physicus, is named as corrector of the book of Eucharius Rœsslin, edition of 1513, published by Martin Flach Jr., the place must have been Strassburg, and the printer M. Flach, for whom Joh. Adelphus prepared the translation.

1499), a physician of Florence, recommended gold as the most excellent elixir of life,[1] and specially advised pills prepared at the period of the conjunction of Jupiter and Venus; indeed he even lauded drinking the blood of little children and young persons as a means of rejuvenation—means by which a Constantine and Louis XI. endeavored to recover new vital energy! Other great spirits of that time defended with all earnestness the Cabala. Thus Pico of Mirandola (1463–1494), and Francesco Pico of Mirandola (died 1533), his nephew, as well as the pupil of the former and of Ficinus, Johann Reuchlin (1455–1522), the son of a messenger of Pforzheim (most of the great minds mentioned sprung from the class of citizens or farmers), cherished the dark side of the spirit of the times, which, in spite of its powerful growth toward the light, could not disown its roots buried in the soil of a darker age. They were men who, indeed, separated mediæval and modern times from each other, but stood with their feet in the one and their heads in the other; in a word men of two epochs of civilization. But when such was the condition of the green wood, what must have been the state of the more or less feeble spirits of that period? And above all what the condition of the masses?

NICHOLAS FALCUTIUS (died 1412)

gained great fame in his day for his "Sermones medicinales". He already displays more independent observation, though he likewise wrote some bare commentaries (on Hippocrates). His independence must probably be credited to his occupying himself with anatomy and surgery. On the other hand the commentaries on Hippocrates, Galen and Avicenna of the Paduan professor

JACOB OF FORLI (died 1415),

are full of scholastic subtilties. He denies the viability of children born in the 8th month, for the reason that Saturn rules in the uterus during this month, and he, as is well known, eats up children!

JACOB GANIVET (about 1418)

may serve here as an example of the way in which the pastoral physicians of the period rendered service to medicine, since he held the various diseases of every man to depend upon his nativity, and formed his prognoses accordingly. Moreover he apportioned to each city a special planet, and derived epidemics from the conjunction of these bodies.

THE SPANIARD, JOHN OF AVIGNON,

composed about 1419 a medical topography of Seville.

NICHOLAS LEONICENUS (1428–1524; born at Lunigo, and hence his name)

was not only a physician, but also a shining light in general education. A famous humanist and professor of medicine at Ferrara, he translated, among other works, the Aphorisms of Hippocrates and was the first to restore this author to his proper position. He also worked a lasting reformation in medicine by his exposure of the errors of Pliny (a bold and important deed in that age still so faithful to authority). He likewise gave currency to astrological explanations of the origin of syphilis (a subject upon which he was the first in Italy to write in 1497), in opposition to the theory of the influence of inundations. He was perfectly acquainted with the symptoms of the disease, even those manifested in the eye and the joints (Purjesz), and regarded it as epidemic and infectious. He also held to the opinion that it had existed in Antiquity.

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[1] It is probably scarcely necessary to recall to the English reader the lines of our own Chaucer:

> "For gold in phisik is a cordial,
> Therefore he lovede gold in special." (H.)

Hermolaus Barbarus (1454–1493)

must also be mentioned here, as he reveals the sources of information of Pliny.

John Concorregio of Milan (1439)

elaborated in the style of the Arabians his "Practica nova, breve lucidarium, et flos florum medicinæ nuncupata". A few good observations on venesection and on a mild form of epilepsy must compensate for the usual lack of independence of an Arabist.

Hugo Bencio (died 1439),

professor, one after another, in almost all the Italian universities of his day and finally at Padua, was a commentator upon Hippocrates, Galen and Avicenna, as well as the author of "Consilia saluberrima ad omnes ægritudines a capite ad calcem perutilia".

The "Practica" of the illiterate professor at Padua,

Antonio Guaineri[1] (Guainierio, died 1447, or according to others 1440),

who also wrote on diseases of women, is distinguished by its relative freedom from the superstition of the day with respect to alchemy and treatment by exorcism, as well as for its nice observations. He e. g. mentions affections in which the memory of a few words only is preserved and to which increased attention has recently been given. He also notices pregnancy in the absence of menstruation, absence of the latter except during the period of pregnancy, rectal concretions etc. Still he also clings to empiricism and astrology.

Mengo Bianchelli of Faenza (about 1441),

on the other hand, was a subtle scholastic and a great astrologist, who recognized e. g. a pulse high in the middle and contracted at the sides, a pulse twisted like a thread, and distinguished abnormal heat as a species added to the natural warmth.

Antonio Cermisone of Padua,

professor at Paris (died 1441), composed "Consilia medica contra omnes fere ægritudines a capite usque ad pedes".

Bartholomæus Montagnana, professor at Padua,

from whom descended a long flourishing family of physicians, also composed some more justly celebrated "Consilia medica".

Thomas Linacre[2] (1461–1524),

the pupil of Chalcondyles and Angelus Politianus, (1454–1494), is also to be classed here on a par with Leonicenus. He was ordinary physician of Henry VII., and of the grossly sensual (like so many bigots) but energetic Henry VIII. (1509–1547). Linacre performed immortal service to English medicine by his excellent translations of Hippocrates, and especially by his foundation of chairs of Greek medicine at Oxford and Cambridge, and of the College of Physicians (1518) at London. His grave is in St. Paul's Church in that city. It was he who introduced Italian Humanism among the physicians of England, and he thus belongs among the reformers of education in that land.

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[1] According to Hæser, Guaineri is the first physician to mention the use of wax bougies, and sounds of tin and silver, in the treatment of urethral stricture. He does not, however, speak of them as anything novel. (H.)

[2] Linacre was born in Canterbury, and received his early education in that city. He afterwards studied in Oxford, where he became a Fellow of All Souls' College in 1484. Proceeding thence to Italy, he studied Greek under Demetrius Chalcondyles at Florence, where he was warmly received by Lorenzo de Medici. He also perfected himself in Latin, under the direction of Angelo Poliziano, and

One of the most famous Italian professors of medicine in this period was

Michael Savonarola (died 1462 as professor at Ferrara),

who wrote a "Practica de ægritudinibus a capite usque ad pedes". He follows the Arabians, but is, however, not without independence in observation and practice, in spite of his faith in the efficacy of precious stones, animal monsters, a human embryo etc. He observed a decrease in the number of teeth to 22, as a rule, in the period after the subsidence of the plague, the development of new ones during pregnancy etc.

Contemporary with him was

Sigmund Polcastro (died 1473) of Vicenza, professor at Padua.

Here belong also **Th. Gaza** (died 1478), who translated the "Aphorisms" of Hippocrates;

Marcellus Vergilius (died 1521)

of Florence, who promoted the science of botany, and

Johannes Manardus (1462–1536) of Ferrara,

at first ordinary physician of the count of Mirandola, then of king Ladislaus of

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studied philosophy and medicine with Hermolaus Barbarus in Rome. On returning to England he decided to complete his studies in medicine, and took his M.D. at Oxford. His reputation as a scholar led to his appointment as preceptor of prince Arthur, son of Henry VII., and his professional attainments procured him the position of ordinary physician to that sovereign, and subsequently to Henry VIII. In the latter office his salary seems to have been £12 10s quarterly. Linacre's familiarity with the Greek language induced him to essay the revival of classical learning in England, and his Latin style is said to almost rival that of Celsus. He translated into Latin the "Oath" of Hippocrates, and the "Methodus Medendi", with several other treatises of Galen. His interest with Henry VIII. and Cardinal Woolsey procured the Grant of Incorporation of the "College of Physicians", London, which bears date Sept. 23, 1518, and is recorded to have been given at the intercession of John Chambers, Thomas Linacre and Ferdinand Victoria, the king's physicians. It provided that no person should practice medicine in the City of London, or within seven miles of it, unless he were a member of this College. The first meetings of the College were held in Linacre's house, No. 5, Knight Rider St., and at his death this house was bequeathed to the corporation. Until the establishment of this College, medical practitioners were licensed to practise by the bishop of London or the dean of St. Paul's. In 1524 Linacre founded three lectureships in medicine, two at Oxford and one at Cambridge, to be called "Lynacre's lectures". By the terms of the foundation, these chairs were to be occupied by professors who should expound Hippocrates and Galen to the students of the University, and *if no person could be found in the University capable of doing this*, competent teachers should be sought for in other societies. Linacre died Oct. 20, 1524, having been ordained a priest in the English Church about five years before his decease. (H.)

Hungary. He was a pupil of Leonicenus, and called Avicenna a mere compiler. His services in the study of Hippocrates, and his recommendation of the observation of nature after the manner of the latter physician, should be prominently mentioned, as well as his critical acumen in the study of natural history, in such contrast to the method of the Ancients.

JACOBUS DE PARTIBUS (Despars),

who died in his native city Tournay in 1465, is worthy of mention for his observations on the spotted typhus and for his commentary on Avicenna, as well as for his introduction of chapters into the works of the Greek and Arabian writers.

WILHELM KOCH (Copus, 1471–1522)

must be noticed here as a translator of the writings of Hippocrates, Galen and Paul of Ægina, by which service he greatly promoted German medicine and stands on a level with Leonicenus and Linacre. He was a professor at Basel.

MATTHIAS FERRARI DE GRADI (died 1472),

professor at Pavia and ordinary physician of Bianca Maria of Sforza, composed again some "Consilia".

JOHANNES ARCULANUS (Giovanni D'Arcoli, died 1484 at Ferrara) of Verona

was a follower of, and commentator on, the Arabians. He was also professor at Bologna and Padua.

PETRUS BAYRUS (Pietro Bairo) of Turin (1468–1518),

ordinary physician of two dukes of Savoy, in his compendium entitled "Veni mecum" was likewise a worshipper of the Arabians. In difficult labors he administers internally a vinous infusion of dittany, seats the parturient woman over a vessel filled with an infusion of herbs, and directs the surgeon to whisper in her ear "Su, Ca, Midur". And it helps!

PAOLO MAGELARDO OF FIUME

wrote in 1472 a treatise entitled "De ægritudinibus et remediis infantum"; and a year later

BARTHOLOMÆUS METLINGER,

in his work "Eyn vast nutzlich regiment der jungen kinder", published the first German treatise on this subject. By these two works the diseases of children were inaugurated as a distinct department of medicine.

BENVENUTUS GRAPHEUS (properly Benvenuto Grassi or Grasso),

a physician of Salerno, developed the subject of ophthalmology. He probably belongs to an earlier period.[1] His book "De oculorum adfectionibus" was printed as early as 1474, but, like the first impressions, must have been a popular and much used work before this time. His "Practica oculorum" was published by A. M. Berger in 1882. Under the head of cataract he understands not only gray cataract, but also amblyopia and amaurosis — precisely like the earlier writers.

DIETRICH ULSEN OF FRIESLAND

was in 1486 city physician of Nuremberg, and became in 1507 ordinary physician of the duke of Mecklenburg.

The so-called "Articella"[2] of the Venetian physician

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1. He is quoted by Guy de Chauliac, who wrote in 1363. (H.)
2. The Articella, Artisella, Artisela, was a popular compendium of medicine, which included: the "Isagoge" of Joannitius; Philaretus or Theophilus "De pulsibus" and "Liber urinarum"; the Aphorisms of Hippocrates, with Galen's commentary

GREGORIUS A. VULPE (Vulpi),
who belongs to this period, consists of a compilation of the translated writings of Hippocrates, Galen, Theophilus and others.

The "Fasciculus medicinæ"[1] of the German physician

JOHANNES DE KETHAM (living at Venice about 1492)
is worthy of mention for its first employment of woodcuts in a medical work.

c. Revival of Human Anatomy.

After the period of the Alexandrian anatomists human anatomy, especially the practical portion of it, had again almost disappeared from the list of medical studies, though here and there probably a sort of dissection may still have been practised, as e. g. by the Rabbi Ismaël[2] at the close of the first century. Even Galen dissected only animals, and he considered it one of the great advantages of Alexandria that human skeletons could there be seen. In the early Middle Ages the Christian priests would have tolerated quite as little as the Koran a violation of God's image, and an impairment of the capacity for resurrection, such as was involved in anatomical dissection, even if the beatitude of faith had permitted the growth of an interest in knowledge pure and simple. They made shift with a study of the anatomy of Galen (since it was the popular idea that the Ancients had perfected ail science), or dissected swine,[3] if they ever desired any information beyond that simple anatomy of the books. When i. e. how early, and where (whether perhaps at Salerno by decree of Frederick II.) human dissections in aid of anatomical studies were revived, is unknown. This much, however, is certain, that the Senate of Venice (in spite of the prohibition by pope Boniface VIII., eight years before) decreed in the year 1308, that a human body should be dissected annually. From this express decree it would seem to follow that this had already been often done heretofore. At all events, William of Saliect and Guilielmo Varignana in Bologna, and Henricus ab Hermondavilla (Mondeville, about 1300) had performed dissec-

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in a Latin translation; the "Prognosticon" of Hippocrates; the "De regimine in acutis" with Galen's commentary in Latin; Galen's "Ars parva" with the commentary thereon of Ali Rodwan. (Marx.) (Baas.)

The different editions of the "Articella" differ somewhat in their contents. The first edition, without place or date, is supposed to have appeared before 1479. The first edition with date and place of publication was that of Venice, 1483. (H.)

1. First edition 1491. The wood-cuts are said to be the work of the famous painter Andrea Mantegna (1431-1506). They are extremely remarkable plates and have the names of Mondini frequently placed upon the wrong parts. (Baas.)

   According to Hæser the first edition of the "Fasciculus" appeared at Venice without any date; the second at the same place in 1491. (H.)

2. He merely boiled, not dissected, the corpse, although the Talmudists declare that bodies may be opened for scientific purposes.

3. Even at the present day it is the popular belief that the hog is constructed internally just like man, an ambiguous compliment, which the earlier savants have upon their conscience.

tions, and a Magister Ricardus, likewise a surgeon and apparently a contemporary of Lanfranc, had written an "Anathomia". But, as a matter of historical fact, the credit of the revival of dissection belongs to Mondino alone, who took hold of the subject at the lucky moment, and in the happy way which calls novelties into existence. The fact too that

MONDINO DE LUZZI

with his immortal "Anatome omnium humani corporis interiorum membrorum" (1316), could, without endangering his life, step into publicity, speaks in favor of an earlier unopposed practice of dissection (i. e. opening of the cavities of the body). All such deeds are, generally, prepared, indeed, long before they are raised to permanent and common intellectual possessions by some spirit, perhaps not great, but (as in this case) fortunate and bold in its grasp of the possibilities of the time.

Mondino de Luzzi (Raimondino, born 1276) was the son of the apothecary Nerino Franzoli de Luzzi of Bologna, whose business he himself at first followed, until he became a professor in his native city and was there venerated "as a god by the entire association of students". In 1316 he went as a deputy to king Robert at Naples, and died in 1326.

His work is written entirely in the spirit of the Arabians, whose nomenclature even is still retained. It lies too in the teleological bands of Galen, so that e. g. Mondino considers the anterior abdominal walls specially constructed without bony supports by the Creator, in order to stretch sufficiently in cases of flatulence and abdominal dropsy, if perchance these diseases should befall one. Observations on operative surgery, together with some false speculations — e. g. the uterus possesses seven cells to facilitate the coagulation of the semen and menstrual blood, when they meet in that organ. The female testicles (ovaries) secrete a fluid like saliva, which excites the sexual organs etc. — are also found, but they deprive this essay of anatomy (which Mondino's work is to be considered) of none of its value in the promotion of medical culture, in spite of the still undisturbed and controlling mania for empty speculations, even among the anatomists.[1]

The dissections of the following period — Mondino, to escape burdening his soul with mortal sin, did not yet venture to open the skull — which were soon so popular that bodies for dissection were stolen, if they could not be otherwise obtained, involved simply the cavities of the body, and the various internal organs were merely pointed out, without the performance of much actual cutting. The sections were made by a "disreputable" barber, and in an unscientific manner by means of a razor. The "Demonstrator" pointed out the different parts with a staff, while the professor read the description from the book, even when the dissection was merely that of one of the lower animals. The professor did not dream of soiling *his* fingers by actually handling the body. Mondino's work was designed to be such a text-book of anatomy, and it maintained general acceptance as such down to the close of the Middle Ages. Besides the dissections of the Italian universities, regular dissections were also made at Prague after the year 1348 (a criminal in prison was first "stabbed" by the executioner, and the corpse was then brought into the anatomical theater), and after 1376 at Montpellier (on an executed criminal also). In 1517 a first dissection was also performed at Strassburg.

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[1] Hyrtl gives us examples of his anatomical nomenclature and literary style in "Das Arabische und Hebräische in der Anatomie", Vienna, 1879. "He who takes in hand an anatomical work of the period before Vesalius, will find whole pages unintelligible to him: Ossa sempsamanie, quæ sunt in juncturis abselamiat; locus inter alchell et alchadam vocatur poera; vena chilis, a jocinore ad anchas" etc.

After Mondino little further advance was made until the 16th century. Up to this time there appeared the following anatomists, most of whom held the chair of surgery in those universities where lectures on surgery were delivered.

BERTRUCCIO (Bertuccio, Bertrutius, Vertuzzo, died 1347), a pupil of Mondino.

NICOLO BERTRUCCI[1];

PETRUS AB ARGELATA (de la Cerlata, died 1423);

BARTHOLOMÆUS MONTAGNANA[2] (died 1460),

who had dissected fourteen bodies, and has been already mentioned;

ALEXANDER ACHILLINI (1463–1525),

author of "Annotationes anatomicæ in Mundinum", 1524, and a professor at Bologna, who described first the ossicles of the ear, with the labyrinth, the patheticus, olfactory nerves, and 7 tarsal bones;

GABRIEL DE ZERBIS (1468–1505),

author of a "Liber anathomie corporis humani" etc., who, though a professor at Padua and Rome, was forced to flee from a charge of larceny, and was subsequently cruelly sawn asunder by the slave of a certain pasha. He made some observations on the uterus and the embryo.

German anatomists of this early period were:

JOHANNES PEYLIGK of Leipzig.

About the same time lived

MAGNUS HUNDT[3] (1449–1519) of Magdeburg,

professor in Leipzig, who wrote an "Antropologium de hominis dignitate, natura et proprietatibus", Liptzick, Wolfg. Monacensis, 1501, with four large and several small woodcuts.[4] At the close of the 15th century also lived

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1. While Tiraboschi questions the Christian name Nicolo applied to Bertrucci or Bertuccio, I know no reason to suppose that there were two physicians of this name, as the text would seem to imply. Bertuccio was one of the teachers of Guy de Chauliac, and a professor in Bologna, where he died in 1342 or 1347. His "Collectorium artis medicæ, tam practicæ quam speculativæ' appeared at Lyons in 1509. (H.)
2. He must not be confounded with Bernardino Montana de Monserrate, who lived after Montagnana, and whose book, entitled "Libro de la Anatomia del Hombre. Un Coloquio del Marques de Mondexar D. Luis Hurtado de Mendoza, con el Autor, acerca de un suenno que sonno el Marques de la generacion, nacimento y muerte del Hombre", Valladolid, S. Martinez, 1551, fol., appeared in 1551.
3. Not to be confounded with another Magnus Hundt (II.), who wrote on the "French disease" and the English sweating-sickness, and is said to have been a kinsman of Magnus I. (Proksch.)

   The work of the latter is entitled "Nuetzlich Regiment sammt dem Bericht der Arzney wider etliche Krankheit der Brust" (Leipzig, 1529). The two writers are not usually distinguished from each other. (H.)
4. The art of wood-cutting, a German invention (though known long before to the Arabians), arose in its rude beginnings at the close of the 14th or the beginning of the 15th century.

LAURENTIUS PHRYESEN (Frisen, Fries, died about 1532),

a physician in Colmar and Metz, who, at the suggestion of the Strassburg physician Wendelin Hack of Brachenau, likewise introduced into his work ("Spigl der Artzny dessgleichen vormals nie von keinem Doctor in Tütsch ussgegangen, ist nützlich und gut allen denen, so der Artz Rath begern, auch der gestreifelten Leyen") woodcuts, drawn from nature by the artist Waechtlin.[1] This work of Fries is the first treatise on pathology written in German.

MARC ANTONIO DELLA TORRE (1473–1506),

professor at Padua and Pavia, for whom Leonardo da Vinci (1452–1519), the greatest savant and investigator among the eminent painters of that day, designed the anatomical plates. So perfect were these, that it is difficult to determine whether the professor or the painter was the greater anatomist, especially as Da Vinci also wrote[2] on anatomy. At a later period Michael Angelo Buonarotti (1474–1564), a friend of Machiavelli, and a great painter, carver in wood, architect and poet, Raphael (Santi, 1483–1520) of Urbino, and Titian (1477–1576) of Pieve di Cadore near Belluno, prepared similar plates, so that by the mutual support given to each other by science and art both departments were materially advanced. So far was this the case that progress in the one cannot be mentioned without reference to the other also, one of the most striking proofs that medicine can be perfectly understood only in connexion with the other sciences and arts, just as the latter can be thoroughly comprehended only by a knowledge of the history of medicine.

ALEXANDER BENEDETTI (died 1525)

may be also mentioned here as an anatomist, as well as a few of the following surgeons, who busied themselves independently with anatomy.

d. Cultivators of Surgery.

Either as the result of the influence of the Crusades, the wounds resulting from which were often first healed at Salerno; or by reason of the revival of anatomy — many surgeons of this period were excellent anatomists, since the professorship of surgery continued, as a rule, combined with that of anatomy even down into the 19th century — or finally, perhaps, in consequence of the gun-shot wounds, now making their appearance towards the close of this period, and which were everywhere considered then, and even into modern times, to be poisoned — probably rather as the combined result of all these influences under the lead of the latter, surgery towards the close of the Scholastic period essayed a rather vigorous flight. This happened in spite of the fact that it still remained partly in the hands of the clergy (who, since the interdiction of surgical practice was still in force against them, were compelled to obtain a special dispensation for each operation) and of the uneducated, lower surgeons, who were originally (at least some of them) the assistants of the clergy and under the control of the physicians, and notwithstanding it was still bound in the fetters of Scholasticism. The knife began to be employed once more in accordance with the principles of art, a practice which had almost entirely disappeared from the later Byzantine period up to the present time. Of course they disputed whether, in the after treatment, wounds and abscesses should be dressed in accordance with the "Relaxation is good"[1] of Hippocrates, or Galen's "Dryness is allied to health"[2] — the former principle defended by the school of Salerno, the latter at Bologna — with poultices or with spirituous desiccative dressings and powders, or — a third method — exclusively by ointments. The actual cautery of the Arabians was also freely employed. Operative midwifery too was united completely with surgery, so far as it could not be managed by midwives. Italians led the array of surgeons, while the Germans, for a long time, were unable to follow their example.

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[1] These first German anatomical plates were published as "fliegende Blätter" in 1517 by Joh. Schott, the bookseller of Mayence. (Subsequently his house became famous for its musical publications, and the family did not die out in the male line until about ten years ago). They were designed not only for physicians, but also for the great public, an historical fact which shows into what wide circles the interest in the lively advances in human anatomy of that time made its way. The localities of the male and female pelvis seem to have enjoyed especial attention. Even earlier than these plates of Schott another set of anatomical plates was arranged in 1493 by Ricardus Hela, a physician in Paris, and published in pamphlet form. (Wieger.)

[2] He wrote with the left hand, and, like the Hebrews, from behind forward, so that his works could only be deciphered by the assistance of a mirror. Probably his right hand was paralyzed.

a. ITALIANS.

It is a peculiarity of Italian surgery that, even from the first portion of the second half of the Middle Ages, it always stood on a level with internal medicine, and was accordingly practised by persons, who were likewise physicians. It was always what that period called a scientific branch, and it enjoyed very early the benefits of anatomy. The Italian surgeons of the earliest times varied very little from the Arabians and Galen. On the other hand the later surgeons struck out their own path, and, indeed, opened the way for plastic surgery by the construction of artificial noses and ears, to which members the justice of that period was especially dangerous. Accordingly

ROGER (Ruggiero) of Palermo[3] (about 1210),

who studied, and was for a long time a professor, in Salerno, borrowed his "Surgery" from Albucasis or Paul of Ægina. He was acquainted with trepanning of the sternum, stitching the intestine over a hollow cylinder etc. He makes the diagnosis of fissure of the skull by observing whether the breath, when held, comes out of the wound or not. He is the first to describe a case of hernia pulmonis, to use the term setaceum (seton), and to employ the sponge in the treatment of scrofulous lesions etc.

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[1] "Laxa bona, cruda vero mala".

[2] "Siccum vero sano est propinquius, humidum vero non sano."

[3] Better known as Roger of Parma. His original "Practica chirurgiæ" exists only in MS., but a substantial co y of the work was made by Rolando Capelluti (about 1250), and subsequently printed. Roger's surgery formed the real basis of the mediæval surgery of Italy, and was often honored with commentaries by later writers. The "Practica medicinæ", which bears his name, is the work of another person — Roger de Barone, or de Varone. (H.)

He belongs to the "Partisans of moist dressings", and was the earliest special writer on surgery in Italy.

Hugo Borgognoni of Lucca (born in the last third of the 12th century, died 1252 or 1268, nearly 100 years old)

was chosen in 1214 city physician of Bologna, where, for a stated salary, he was to treat the poor, and in ordinary cases others also, free of expense. In difficult cases, however, the well-to-do were to be treated for a wagon-load of wood, the rich for a load of hay, or 20 solidi.[1] He was the author of the "Dry method of treatment". A son[2] or pupil of Hugo, and chiefly a follower of his teachings, was

Theodoric Borgognoni of Cervia (1205–1298),

at different periods a Dominican monk, house physician of Innocent IV., finally bishop of Cervia, but a resident for the greater part of his life in Bologna. Among his peculiar teachings were: soft bandages in place of wooden splints; symptoms of the western leprosy, and division of this disease into species; salivation from mercury; narcotism of the patient to be operated upon (like Nicholas Præpositus) by opium and hyoscyamus, and re-awakening him by vinegar and fennel. He was an advocate of the moist treatment.

Roland of Parma (about 1250),

professor at Bologna, followed his master Roger of Parma in all respects, though he excised chancres, scrofulous glands and goitre.

Both of these writers, however, were commented upon by the "Four Masters",[3] who lived about 1270 in Salerno, though according to other authorities in Rome. They were probably surgeons living together in the style of the monks, and their commentary is regarded as the ablest of the mediæval works on surgery. Guy de Chauliac also mentions in no very honorable way a surgeon

Jamerius (Jamerus), of this period, but of his life nothing further is known.

Bruno of Longoburgo in Calabria (about 1252),

professor at Padua, whose "Chirurgia magna" and "Chirurgia parva", compiled from the Greeks and Arabians, were very celebrated, followed again the dry treatment. He mentions operations upon the teeth and the antrum of Highmore, and introduced a powerful method of extension. He also notices amputation in gangrene of the limbs, in which he follows Abulcasem and Paul of Ægina; is acquainted with a hook for the ligation of bleeding vessels, and knows that the hæmorrhage from pulsating vessels (arteries) is difficult to stop, while that from non-pulsating (veins) is easy. (Albert.)

A man of ointments, though he did not shrink from lithotomy even, and treated goitre etc. by operation, was the acute observer

William of Salicet (1201–1277, or 1280) of Piacenza (hence called William of Placentia, Guilelmus Placentinus),

professor at Bologna and Verona, where he was municipal physician. Besides his "Chirurgia" he also wrote on subjects pertaining to internal medicine, and even a short anatomy. He found the causes of difficult healing to be e. g. full habit, dryness, unhealthy suppuration, too violent treatment, presence of a foreign body etc. He recognized ulcers from cohabitation with a devotee of venal love, and is said to have been the first to expressly designate the latter as the cause of ulcers of the genitals and to ascribe to it even gangrene of the penis, but he considered it improper for a cleric to write on the diseases of females. He recognized arterial bleeding by the spirting stream of blood (Albert). With clerical cunning and an accurate knowledge of mankind he advises not to deport oneself too intimately with the laity, and under all circumstances to claim good pay; for this occasions respect for the treatment (instead of for the art) — a piece of advice given as early as the time of Isaac Judæus, but not fully carried out even to-day.

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[1] The mediæval custom of payment in kind (at least one-half) prevailed also at this time.

[2] The clergy at this time might be legitimately married, as celibacy was not yet thoroughly enforced.

[3] "Glossulæ Quatuor Magistrorum super Chirurgiam Rogerii et Rolandi", edited by Daremberg, and published in 1854. It forms a most valuable mirror of mediæval surgery, and is well worth the attention of students of medical history. (H.)

Petrus ab Argelata,

a pupil of Guy de Chauliac and professor at Bologna, was also a surgeon of importance. He left much to nature, which alone accomplished even the most difficult cures. He embraced the "dry method", recommended compressing bandages in chronic ulcers, did not sew up wounds of nerves, cauterized varicose veins, accomplished the removal of teeth rather by medicine than by pulling them out, occupied himself with the smoothening of frizzled hair and the adornment of the nails, but also practised boldly the excision of indurated testicles, operated on fistula in ano, and mentions the fatality of the entrance of air into the jugular vein. He was the first man who once again, after the manner of the Ancients, practised midwifery, perforating the skull, and then with the finger in the wound extracting the head etc. In wounds of the head he employed a wound-powder and the Pater-noster.

A pupil of the physician just mentioned was

Marcellus Cumanus (14th and 15th centuries) of Venice,

who treated gun-shot wounds (which he did not regard as poisoned) with warm oiled bandages.

Antonio Guaineri

must be again noticed here, in consequence of his mention of urethral bougies, and

Nicolo Bertrucci,

for his recommendation of the artificial rupture of the fœtal membranes.

So also we must notice here again

Bartholomæus Montagnana,

who, like Petrus ab Argelata, was acquainted with syphilitic affections. He was acquainted with the strangulation of hernia and the chief symptoms of this condition. He preferred to employ medication, rather than more active measures, though he operated on lachrymal fistulæ and extracted unsound teeth.

Leonardo Bertapaglia (died 1460),

professor at Padua, towered above the surgeons of his time, since he had himself dissected two corpses and practised operations for cancer, transfixion and ligation of vessels and resections, but, on the other hand, in wounds of the head he employed ointments only.

Johannes Arculanus (Giovanni d'Arcoli, Herculanus)

is a follower of the Arabians in surgery, and consequently a man of the hot iron. He practised the taxis in strangulated hernia, after premising enemata, a poultice and a bath; filled teeth with gold, and endeavored to remove splinters of iron from the eye by means of the attraction of amber electrified by friction. He also gave a description of 30 pairs of spinal nerves and of the structure of the brain.

Antonio Benivieni (died 1502)

was an important, independent and observing Hippocratic physician of Florence, who recommended paracentesis at the navel, following an observation of the spontaneous cure of such a case; removed stone by dilatation of the female urethra, and undertook bronchotomy and the extraction of cataract. On the whole, however, he embraced the established views. He is also worthy of mention as an obstetrician (he revives notice of podalic version), pathological anatomist (on the hidden causes of disease), and pathological reporter (gall-stones etc.).

Of equal importance was

ALEXANDER BENEDETTI of Legnago

(already once mentioned), who in 1490 practised in Crete and the Morea, then in 1493 was a professor at Padua, and again in 1495 an army physician, dying in 1525. His rich experience and his anatomical knowledge rendered him an independent surgeon, who operated on hernia after a special method, and, among other matters, first mentions artificial restoration of the nose — an operation abandoned after the time of Celsus, but again invented independently in the middle of the 15th century by lay members of the family of

BRANCA of Catanea.

The members of this family at first made use of the skin of the forehead or cheek, subsequently of that of the arm. They also restored lips and ears. From them the method passed into the family of

VIANEO (Bojani: Vincenzo, his nephew Bernardino, and his sons Paolo and Pietro) of Tropæa in Calabria, whence

CASPAR TAGLIACOZZI[1] (1546–1599) of Bologna

learned the procedure and described it. Syphilis and a nose-destroying pope, who fixed upon amputation of the nose as a punishment for larceny, afforded the most frequent occasion for these rhinoplastic operations. In the 15th century occurs also the first appearance of the

PRECIANI and NORSINI,

(guild surgeons educated in the surgical school which probably descended from the medical school of Crotona) of Norcia in Calabria. They took their name (as Gyergyai insists) from their place of birth, but had different family names and belonged to different families. These families were eminent as herniotomists, for lithotomy, operations for cataract, trepanning and operations for hernia were still abandoned to itinerant surgeons, who, however, introduced no considerable improvements in the operation. The same persons also performed castration. (Gyergyai.)

β. FRENCH.

Surgery in France, in contrast with Italy, was entirely separated from medicine in the second half of the Middle Ages. As inferior to medicine it was placed entirely in the hands of the laity, in accordance with the maxim "The Church shrinks from blood" — a maxim which, as is well known, was not based in the most remote degree upon the truth, and never, indeed, became true. Among the various medical departments, surgery must be regarded as the national branch of the French. This is manifest too from the fact that the surgeons of France appear at an early period as a graded and distinct class, possessing a special college of their own. They were divided into guilds of inferior and superior surgeons, the former of whom were subordinate to the latter, while both were under the control of the physicians of internal medicine, i. e. the Faculties. Hence arose interminable disputes between the various orders, which continued down almost to the present century.

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[1] Tagliacozzi's work entitled "De chirurgia curtorum per insitionem" etc. appeared in 1597. Butler in his "Hudibras", published in 1663, refers to him as follows:

"So learned Taliacotius from
The brawny part of a porter's bum
Cut supplemental noses, which
Would last as long as parent breech." (H.)

Such an association of surgeons, most influential and important in the development of modern surgery, was the "Collége de Saint Côme", which arose under St. Louis (reigned 1226–1270), a monarch so pious that he forbade the employment of Jewish physicians. Its organizer and president was the royal surgeon Jean Pitard (1228–1315), who has thus become a character of importance in the development of surgery and medical culture. The members of this "confrérie" had already separated themselves from the barbers, and in 1254 claimed a board of examiners in order to rival the Faculty and defend themselves against the former. (Daremberg.) They formed a guild of superior surgeons, and, like the laity, were permitted to marry. They must understand Latin, must have pursued the study of medicine and philosophy at the university for two years, and the study of surgery for two years longer, before they were permitted to be received into the guild and authorized to wear a long robe, like the Magistri in Physica. Hence they were called "Surgeons of the long robe" in contradistinction to the lower class of minor surgeons, the "Surgeons of the short robe", — a distinction which gave rise to offensive disputes about rank between the two classes.[1]

Although a comparatively high grade of guild-surgery was thus attained, it was still held in little esteem scientifically. The latter element was furnished it by a fortunate accident. In consequence of the wars of the Guelphs and Ghibellines, Lanfranchi of Milan, a pupil of William of Salicet, a man (after the manner of the Italian surgeons) well versed in the writings of the Ancients, practical and capable, was forced to fly from his home. He turned his steps, therefore, first to Lyons, but went subsequently in 1295 to Paris, at the university of which city he would have held lectures in accordance with the wishes of Passavant, the then chancellor, but dared not do so in consequence of his married condition—all professors were required to be clerics, and therefore celibates. He then accepted membership in Pitard's "Collége de St. Côme", and delivered lectures which were numerously attended. Moreover he took his pupils to the sick and to operations, and thus held clinical lectures. Lanfranc died after 1315.

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[1] Saints Cosmas and Damianus were twin Christian physicians, who suffered martyrdom in the persecution of Diocletian A. D. 303. Many miraculous cures were said to have been accomplished upon pilgrims to their tomb, and the martyrs themselves were eventually elevated to the position of patron saints of the surgical art. The disputes between the French physicians, surgeons and barbers are only equalled in persistency and gall by the later disputes of medical historians with reference to the facts and dates of the various events in the history of the famous "Collége de St. Côme". Even the epoch of Jean Pitard is a subject of grave differences of opinion, and the dates assigned to the foundation of the Collége vary from 1033 to 1268. It is as well, probably, to accept the statements given in the text.

In England the "Barber-surgeons" were incorporated by a charter bearing date February 24, 1461, under the title of the "Masters or Governors of the Mystery or Commonalty of Barbers of London". They had existed, however, as an unincorporated guild since the early part of the 14th century. In Hamburg a similar guild of "Meister Bartscheerer" was formed in 1452.

The "Collége de St. Côme" maintained its existence as late as 1713, when it was merged into the "Académie de Chirurgie". (H.)

In his "Major" and "Minor" surgery Lanfranc shows himself a great partisan of the actual cautery and very timid with the knife. He avoids trepanning, operations for cataract, lithotomy etc., and admits even paracentesis in young and strong persons only, while he also considers the extraction of teeth dangerous. In these as well as other respects he is evidently influenced by the belief of his time. In fractures of the skull he authorizes invocation of the Holy Ghost, probably because he was not willing to do anything else, and according to Albert, he is the first to describe concussion of the brain and percussion of the bones for the recognition of fissures. On the other hand, he operates in empyema, deep abscesses and wounds of the intestines, is acquainted with venous and arterial hæmorrhage (the former steady, the latter by spirts), against the first of which he employs styptics, compression with the finger for hours, and finally ligation. He distinguishes 32 forms of ulcers according to the cardinal humors and elementary qualities — among these such as arise from impure intercourse — cups and cauterizes poisoned wounds, treats diseases of the eyes, ears and nose, hernia, fractures and dislocations, diseases of the skin, cauterizes and sutures hernia, etc. He also gives excellent advice to the surgeon how to thrive and how to deport himself, and among other things lays down the following precept well worth recognition — he should aid the poor to the extent of his ability, but get all he can out of the rich.

After Pitard, who wrote nothing, the next famous French surgeon and author of distinction was the already mentioned Henricus ab Hermondavilla, properly

HENRI DE MONDEVILLE (died about 1315),

teacher first at Montpellier and then physician of Philip the Fair (reigned 1285-1314) and professor at Paris, which latter school, in spite of Lanfranchi, was unable at first to attain any considerable importance. According to Hyrtl, he was the inventor of anatomical plates, but they were employed as early as the days of Aristotle and Galen.

As soon as the way to further progress was revealed to the French, with the gift of quick conception and the practical address so peculiar to their race, they at once seized upon their national branch. Thus, though not the original founders — these were the Italians, — they were yet the earliest heralds and propagators of the restoration of scientific surgery, and in this department they have held the lead, though in recent times they are compelled to yield something to the Germans and the English.

The earliest herald of the modern surgery was

GUY DE CHAULIAC (Guido de Cauliaco), born in a hamlet of this name on the borders of Auvergne about A. D. 1300. He was chaplain and ordinary physician of pope Urban V. at Avignon, after having studied at Bologna, Paris and Montpellier, probably also at Prague, and practised a long time at Lyons. In his position as chaplain he wrote in 1363 his pioneer work "Chirurgiæ tractatus septem, cum antidotario",[1] a treatise which retained exclusive sway in France for many decennia. Another work by the same author "On gray cataract", written for the blind king John of Bohemia, father of the emperor Charles IV., has been lost.

His surgical treatise, which also contains some remarks on the subject of midwifery (sternutatories, the employment of a screw-like instrument for the purpose of enlarging the os uteri sufficiently to permit the extraction of a dead child, Cæsarean section through the left side and after the death of the mother, cephalic version etc.), so far as this art did not then devolve upon midwives, is marked by historical comprehensiveness and critical judgment in its department, by freedom from subtilties, sober judgment of the acquisitions of an earlier day, truthfulness in respect to the author's own observations, a very good statement of the indications, a high estimation and knowledge of anatomy (proportioned of course to the period), curious etymologies and definitions and some superstition. He performs venesection according to the seat and grade of the disease, without regard to one or the other side, opens boldly deep-seated abscesses, slits up fistulæ, and employs compressive bandages in ulcers. In caries, anthrax and all suitable lesions he uses, however, the actual cautery, especially in open cancer, which he declares allied to leprosy. Non-ulcerating cancer, on the other hand, he cuts out from the roots. Dislocations and fractures are discussed, and diseases of the eyes, i. e. operations upon them, are treated particularly well. Guy recommends spectacles (berilli, because ground from the beryl) when eye-waters do not relieve weakness of sight. He does not avoid trepanning, and lays down precise indications for its employment (he had removed a part of a man's brain, yet he recovered), performs lithotomy and removes pharyngeal polypi; in abscesses of the tonsils he curiously enough (probably he had had some experience in hæmorrhage when they were opened with the knife) has the patient swallow a piece of raw meat to which a stout thread is attached, and then draws it out again with a sudden jerk, having previously administered an anæsthetic inhalation. In case of supernumerary sound limbs he resorts to removal with the knife, but in gangrene adopts a bloodless operation by means of strips of plaster drawn tightly around the border of the adjacent sound parts until the gangrenous part separates. He unites wounds with the design of securing healing by first intention, removes foreign bodies, and spares the exuded plastic material with the same object. Hæmorrhages he divides into arterial and venous, and stays the former by styptics, stitching together the edges of the wound, division of half severed vessels, the actual cautery and ligation. According to Guy's statement, there were in his day five sects of surgeons. The first employed poultices in all wounds and abscesses. To this sect belonged Roger, Roland and the "Four Masters". The second in the same cases employed simple wine (Bruno, Theodoric). The third used soothing ointments and plasters (William of Salicet, Lanfranc). The fourth (the Germans and those who accompanied the armies) employed oil, wool, drinks and charms. The fifth (women and the illiterate) had recourse to the saints (Freind).

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[1] Better known as the "Chirurgia magna". A Formulary by the same author is usually called his "Chirurgia parva". (H.)

In the fifteenth century also appears the first mention of the family of lithotomists named Colot, one of whom, known as Germain, with the permission of Louis XI., is said to have performed supra-pubic lithotomy upon a condemned criminal in 1474. Among the

γ. DUTCH.

JEHAN YPERMAN of Ypern (1297–1329 according to Burggræve) had introduced surgery from France as early as the beginning of the 14th century. He was of the school of Lanfranc.

δ. THE ENGLISH.

JOHN ARDERN, a contemporary of the poets John Gower (1323–1408) and Geoffrey Chaucer (1340–1400), should be noticed here as an English surgeon. His work contains numerous plates of instruments. [Ardern was probably an alumnus of Montpellier who practised in Newark from 1349 to 1370, in which latter year he removed to London. He wrote a "Practica", which exists only in MS., but the chapter "On the fistula in ano" was translated and published in English by John Read in 1588. According to Daremberg, who consulted and copied the copy of Ardern's "Practica" preserved in St. John's College, Oxford, this work is deficient in method and order, but abounds in personal observations. He styles it a collection of short monographs on different subjects of surgery, with a mass of plates of curious instruments and operations. In the treatment of fistula Ardern professes to have been particularly successful.

We may notice here also **THOMAS MORESTIDE** and **WILLIAM BREDEWARDYN**, who, on the occasion of Henry the Fifth's second expedition to recover Normandy in 1417, were authorized by royal warrant to press into service as many surgeons and instrument-makers as they could find in the city of London or elsewhere. Both were probably barber-surgeons, though Morestide was ordinary surgeon to three English kings, Henry IV., Henry V., and Henry VI. He was likewise the chief surgeon of the expedition mentioned above, and was required to equip fifteen men, three archers and twelve surgeons. His salary was £40 a year, or twelve pence a day; while his archers and assistant surgeons received £20 a year, or six-pence a day. Morestide was also allowed a share of the prisoners and booty. He died in 1450. A certain Nicholas Colnet (probably a Frenchman) acted as field-surgeon likewise on this expedition. (H.)]

ε. SPANIARDS,

who wrote in the 15th century upon surgical subjects, were:

DIEGO DEL COBO (surgery in verse), **JOHN OF AVIGNON** and **JUAN GUTIERREZ**, a physician at Anteguerra in the province of Malaga (On Lithotomy).

ζ. GERMANS.

From his name we might mention here Rusticus Elpidius, ordinary surgeon of king Theodoric. But we shall notice neither the honorable "Leibparpier" Peter Münch (1458), the ordinary surgeon Oswald Tremlinger (about 1458), Meister Hannsen von Beyreut (1460), nor the oculist Meister Hermann (about 1490), as the first German surgeons, because they are known only by name and none of their writings are extant. But a different treatment is due to the German surgeon

HEINRICH VON PFOLSPEUNDT (or Pfolsprundt),
author of the "Bundt-Arzney" (1460). He is the earliest writer to mention gun-shot wounds, and manufactured noses in Germany in the style of Branca — he had been in Italy — and likewise operated upon harelip. Second in point of time, but from his extensive importance the first German surgical writer is

HIERONYMUS BRUNSCHWIGK of Strassburg,
of the Saulern stock (1424? about 1450-1533), who has left us a surgery: "Dis ist das buch der Cirurgia. Hantwirchung der wundartzney. 1497 strassburgk, von Hieronymo brunschwig".

The contents of this work are by no means so imperfect as we should expect in such an early age, and, accordingly, it is fair to infer that at this period and still earlier there may have been in Germany, as well as in other lands, other persons capable of writing on surgery. Even if the circumstance that Hieronymus had studied in Bologna, Padua and Paris leads us to a different conclusion, still he himself mentions another capable German surgeon,

HANS VON DOCKENBURG,
who, in accordance with the proclamation for a surgeon of Matthias Corvinus (died 1490; founder of the Bibliotheca Corvina), king of Hungary and a discriminating patron of the sciences, removed from that monarch an arrow-head which he had long been compelled to carry about.

From the treatise of Hieronymus we gather that the surgeons of his day were laudably zealous in maintaining their surgical honor. One should not "when one surgeon is not present reprove or slander the others, but if two, or more than one attend, they should manifest before the patient no difference of opinion", which is more than we sometimes experience to-day. He also admonishes, in those diseases where surgery and medicine jostle each other, e. g. in the bites of rabid dogs — he describes very satisfactorily too the diagnostic signs of "tobigkeit des Hundz" — that a physician (medicus) should be called in. Friendliness among colleagues he regards as a beautiful quality — a very antiquated idea according to our present customs! The book comprehends merely subjects of surgery and military-surgery; wounds in general, gun-shot wounds particularly, which he regards as "poisoned"; injuries from blows and stabs, fractures, dislocations, recipes and the physical and mental requirements of the surgeon. It is clearly and calmly thought out, and passably well written, so that German surgery may be proud of this, its first fruits, from the then outpost of German civilization, Strassburg, a city which would fain be ashamed to-day of its German origin.

e. Cultivators of Pharmacology (Pharmacy).

The number of pharmacological or pharmaceutical writings in the last half of the Middle Ages is disproportionately great. This might surprise us did we not know that, in consequence of the scarcity of physicians in those days, these books were sought after as treatises on domestic medicine (about like "unser Bock der Gartenlaube", in spite of the superfluity of physicians to-day); and that in those times the physician saw in the knowledge of open and secret remedies the chief part of his qualifications; for doctors, as well as patients, were the firmest of believers in the influence of drugs, even more credulous than at the present day, when very little seems lacking in this respect. A number of the following authors discussed pathological subjects also, and only their best known works, or those especially esteemed in their day, belong in our present section. It must be added too that, through the influence of the Byzantines, or better the Arabians, through that of alchemy i. e. chemistry, and finally through the origin of pharmacies in the West during the last centuries of the Middle Ages, the study of pharmacology and pharmacy took a stride greater than it had done since the Alexandrian period.

We might mention again in this place many of the physicians already noticed, such as Albertus Magnus, Arnold of Villanova, Raimond Lull and others. We begin, however, with

John of St. Amand (about 1200) of Hennegau, Canon of Tournay,

who must not be confounded with the ordinary physician of the licentious monster, pope John XXII. (1316–1334), who bore the same name. He wrote an "Expositio supra antidotarium Nicolai", in which are given especially the indications for the different remedies and their action, as well as the curative methods (evacuative, symptomatic etc.). On the other hand

Pietro de Tussignana[1] (about 1250),

professor at Bologna, limited himself to "Medical formulæ", "On the baths of Bormio", but also wrote a treatise entitled "De regimine sanitatis".

Giacomo de Dondis[2] (born 1298),

professor at Padua, in his "Aggregator" and "Herbarius" (with plates) wrote on simple medicines.

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[1] Hæser says there were no less than three physicians of this name: 1. A teacher of William of Salicet (about 1270), who was the author of the "Regimen sanitatis"; 2. The author of the "De balneis Burmi apud Volturenos liber", who visited these baths in 1336; 3. A later professor in Bologna, Pavia and Ferrara, who flourished about the end of the 14th century. (H.)

[2] There is considerable confusion among medical historians as to the relationship of the physicians Dondis and their writings. According to Hæser, Giacomo (Jacobus, James) was the father and author of the "Aggregator de medicinis simplicibus" (Aggregator Paduanus, Promptuarium) and treatises "De causis caliditatis aquarum Aponensium" and "De fontibus medicatis agri Patavini". He died in 1359. Giovanni (Johannes, John), a famous physician, orator, mathematician and physicist (born 1318), was a professor in Padua and Pavia and author of a treatise "De fontibus calidis agri Patavini". He manufactured a famous astronomical clock ("astrarium") and presented it to his patron Giovanni

To the first part of the 13th century also belongs the German dispensatory of

MEISTER BARTHOLOMÄUS,

which introduces numerous drugs, among these some Arabian preparations, e. g. rose-water etc.

"Rose-water is good for the face, it makes the skin soft and beautiful, and also makes troubled eyes clearer, while ailments on the face it cures completely."— "Chamomile-water is good for him who cannot sleep from sickness, and it makes the principal vein vigorous, and brings also the medullæ to their normal vigor".

GUILELMO VARIGNANA,

who in 1302 was professor at Bologna and died in 1330, followed the Arabians and the Cyranid. He was son of the Bartolomeo Varignana who wrote on "The doses of medicines", had also already dissected two bodies, and was the father of Pietro and Matteo Varignana, both in like manner teachers at Bologna.

SIMON DE CORDO[1] (died 1330) of Genoa,

in order to acquire a knowledge of medical plants in their native places, and to learn to name them correctly, made a journey through Greece and the Orient, but, instead of his own experience, used as a guide the Galenic ideas with respect to the elementary qualities etc. of the different plants.

GIOVANNI DE DONDIS (about 1380),

son of Giacomo and a friend of Petrarch (who lamented in him the single fault that he was a physician), wrote two treatises on bathing; "On the source of the warmth of the springs of Abano" and "On the medicinal springs of the province of Padua".

The toxicological work "De venenis" of the physician

SANTE ARDUINO (1430) of Venice,

and the dispensatory (Compendium aromatoriorum[2]) of

SALADIN OF ASCULO in Naples,

about 1447, do not belong to the pharmacological department.

To the pharmaceutical writings of this time belongs also the "Dispensatory" of a certain French physician called sometimes Ortolff Meytenberger, sometimes O. Meydenberger, and again O. von Bayerland, a work[3] which already contains a plate of the human skeleton. To this we may add the illustrated herbal (herbarius), published in the Latin, German, Dutch, French and Spanish languages, and in various dialects, entitled "A Garden of Health" and ascribed to

JOHANN WONNECKE (Dronnecke, also Joh. v. Cube or Cuba, about 1484)

of Caub, city-physician at Frankfort-on-the-Main, 1483, who accompanied the great Breydenbach expedition to the Orient.[4]

Visconti of Pavia. From this circumstance he received the title "dagli orologi" (ab horologio). The "Herbarius" is not mentioned by Hæser, and, according to Meyer, is probably the work of a German writer.

[1] Perhaps better known as Simon of Genoa (Simon Januensis. Geniates). His treatise was entitled "Synonyma medicinæ", but is better known as the "Clavis sanationis". (H.)

[2] Hæser, for some reason unknown to me, calls the work "Lumen apothecariorum", and says Saladin lived about 1320. The statement in the text is that most commonly accepted. (H.)

[3] It is partially copied from the "Buch der Natur" of Kunrat von Megenberg (1307–1374). (H.)

[4] Well-known participants in this expedition were: Sir Bernhard von Breydenbach (died 1490), John count of Salms, Sir Philip von Bicken, Baron von Meernawe, the Knight von Bulach, Sir George Marx, the Knight von Kurt, the painter Erhart.

DIETRICH ULSEN[1] (about 1490)
composed a pharmaceutical poem.

HIERONYMUS BRUNSCHWYGK
was the author of a "Liber de arte distillandi de simplicibus" (1500), in which, among other things, human blood and human dung-water were adduced as great remedies: likewise cow-dung water of the month of May, and even the dung of a lustful bull in the treatment of ulcers of the bones, and internally for belly-ache (Pruckmayer). The author here quoted thinks the materia medica of the Middle Ages forms to-day still the basis of therapeutics!

Here must also be mentioned the receipt-book[2] of Johann Tollat von Vochenberg. a physician and professor at Vienna; the "Ricettario Florentino" (about 1490), and finally special writings of the alchemists Basil Valentine[3] (the discoverer of antimony) and Isaac and Joh. Isaac Hollandus.[4] The latter prated about the philosophers' stone, of which if one took every ninth day in wine a piece the size of a grain of wheat, he would, indeed, sweat, but would become more lusty and stout, so as to believe himself in paradise — a result accomplished satisfactorily at the present day by wine without the philosophers' stone!

f. Veterinary Medicine.

The condition of veterinary medicine in the first half of the Middle Ages was substantially the same as with the Ancients. Besides the writings of the latter collected during this period, we find veterinary medicine and veterinary physicians mentioned only in the decrees of Charlemagne. This department of medicine also first took a more independent start in the Scholastic period, when even ordinary physicians, philosophers and emperors were not ashamed to cultivate veterinary subjects — especially hippology and the sport of falconry, so fashionable at this time. Thus an Albertus Magnus, a Vincent de Beauvais, a Theodorich of Cervia, and even a Frederick II. must be named, among others, as skilled in the veterinary art. Theodorich wrote on diseases of horses and of falcons, while the great Hohenstaufen, the most liberal minded and least prejudiced man of the Middle Ages, composed a work "De arte venandi cum avibus", which contained a complete anatomy of the falcon. King Manfred of Sicily, son of Frederick, also made some commentaries upon this work.

Frederick II. spoke and wrote Italian, French, German, Latin, Greek and Arabic.

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[1] Phillippe calls him Theodor Ulsenius and gives the title of his poem "De pharmacandi comprobata ratione". (H.)

[2] Entitled "Margarita medicine". (H.)

[3] A Benedictine monk in Erfurt (middle of the 15th century), who formed a very pretty conception of the resurrection as the termination of a chemical process. "Men for their sins were by death salted down in the earth until putrefied and rotten through time, when they were again awakened by the celestial fire, clarified and raised to the heavenly sublimation and exaltation, since all dregs, sins and impurities were separated forever". In opposition to Galen and the Arabians he insisted upon the use of chemical remedies, even including poisons.

[4] Phillippe says they were father and son, and assigns both to the beginning of the 15th century. (H.)

and even ventured to gainsay Aristotle and the pope (the two most considerable authorities of that age), in a period when the former was undisputed emperor in the kingdom of thought, as the latter in the domain of faith. In his book he remarks that most of the bones of birds are hollow, and he also states untruly that birds can move the upper mandible, and describes the arrangement of the claws etc., entering into the minutest particulars.

We must mention further

BONIFACIUS,

who lived under Charles of Anjou (1266–1285) and wrote on the diseases of the horse; also

PETRUS DE CRESCENTIIS of Bologna (about 1250),

who, in the style of the Ancients, in his work on husbandry discussed also veterinary medicine; and

LAURENTIUS RUSIUS (about 1300),

veterinary surgeon at Rome, who has left us a "Liber marescalciæ" — veterinary medicine was called marescalcia at this time as it was termed mulomedicina in Antiquity.

Writings on veterinary medicine of this period by Albert of Cortenova, Dinus, Bartholomew Spadafora and others, are also extant.

That veterinary medicine, however, in this period, lay only exceptionally in scientific hands, may be easily believed, and the just mentioned works remained, on the whole, without influence on practical veterinary art. This continued in the hands of even the rudest empirics, as it does for the most part even to-day. The latter employed the selfsame methods of cure as did one of their colleagues of to-day, who cut off the dropped kid of a goat, but when he saw that the beast by this method died, he afterwards concluded to cast a ligature about the cord, when to his astonishment the second kid died also.

5. EPIDEMICS AND NEW DISEASES WHICH AROSE DURING THE LAST HALF OF THE MIDDLE AGES

If we were justified in calling the early portion of the Middle Ages the epoch of plagues, the second half of the same period appears the special germinative season of epidemic diseases. The latter, after a brief stage of ripening, produced a most terrible harvest, which promoted, indeed, the physical, as well as spiritual, renovation of the human race, but a harvest which, after grievous conflicts beyond the Middle Ages, now first began to bear fruit.

The causes of this phenomenon were in part prolonged in their effect from the last ages of Antiquity. In this connection we must mention, first of all, the wandering and restless migration of peoples (including the Crusades) and of individuals. From this arose gradually complete insecurity of property, with its lack of employment, idleness, and their result, imperfect cultivation of the land. The latter brought about a failure of crops, which again, united with the utter want of good roads and commercial facilities — the first post-road e. g. in Europe was opened in

1497 — and the lack of a corn trade, created dearth and famine,[1] continual poverty and generally insufficient, bad and coarse means of subsistence. The Middle Ages were socially and hygienically a most degraded period! Causatively united with these phenomena were the inferior clothing (almost exclusively leathern or woolen — regular hunting-suits) and personal uncleanliness, always proportional to the general lack of civilization.[2] Bathing-houses (Badstuben) existed, indeed, in almost every hamlet, but how great this uncleanliness was may be judged from the facts (otherwise, of course, insignificant) that pocket-handkerchiefs were necessities unknown to even emperors and high-born ladies — they blew their noses aside with the finger! ; that the fingers were the only knives and forks at the table, and especially that they could find in gross hoggishness — kissing leprous ulcers for example — such meritorious Christian exercises, that they are said in some instances to have resulted in securing a choice position among the saints of heaven! The numerous bathing-houses too, from institutions for cleanliness, became places of unclean lust and lasciviousness, as were also many of the convents, though designed solely for the purification of the soul. At a later period too were added dense crowding in for the most part small, irregular walled-towns, together with public, added to private, uncleanliness. From some of the evils mentioned and the abuses of the religious orders there resulted now the grossest and (in accordance with the barbarous period) the most barbarous immorality. So gross and artless was this, that in many houses a school was accommodated below, and above, a brothel, while in Paris e. g., in consequence of the number of the importunate and "merry" worshippers of Venus, it was as difficult to pass through the streets by night, as it was by day in consequence of the animals running and driven about, and whose dung adorned the unpaved thoroughfares.[3] The constant wars also, the defective structure of the houses, the stinking gutters and bad methods of interment within church-yards in the midst of cities (prohibited even by the laws of the Twelve Tables) and villages,[4] must not be forgotten. All the foregoing evils favored the contagiousness, and thus the origin, of epidemic diseases among the masses. The general overtension of the mind excited by the faith also caused an outbreak of psychical epidemics, like the epidemic pilgrimages which we witness in France at the present day.

The oldest and most widely extended disease among those which visited the Middle Ages, and which we meet also in the earliest antiquity (though only in its lighter forms), was the leprosy. Under this term very different contagious and non-contagious skin-diseases, together with the leprosy proper, seem to have been comprehended, so that the confusion can be no longer unravelled, particularly as the genuine leprosy has long since disappeared from the West. It must be added, that this disease in its period of bloom was tortured into the theory of the cardinal humors and elementary qualities, in accordance with which its forms, and even its symptoms, were modeled.

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[1] Famines were among the most frequent occurrences of the Middle Ages. Indeed, from the 11th to the 15th century a famine recurred about every fourteen years, and during this period 32 great plagues raged.

[2] As we observe even to-day, for we judge the civilization of a people by its use of soap!

[3] While ancient Rome had sidewalks and paved streets, none were laid in Paris before the 12th century.

[4] These in all quarters had open and foul wells in ordinary use, which must frequently, therefore, have been looked upon as designedly poisoned.

Cutaneous discolorations, specks, scabs etc. served as premonitory symptoms. To these substantially two forms might follow, the common leprosy, and the knobby or knotty leprosy (elephantiasis), either of which again might take on an acute or a chronic course, by which the greater or lesser, the more speedy or lingering, mortality was determined.

The prodromata of the disease were commonly lassitude, irritability, a peculiar staring look, disturbances of digestion, fever, general redness and swelling of the skin, and violent pains, especially in the limbs. Then, when recovery did not take place (and recovery was a very rare occurrence) or a stationary condition or death ensue, superficial knobs were developed under the skin, especially of the back of the hands and feet, of the body or the face, through which a peculiar coppery redness disfigured the latter. The misshapen nose, the distorted ears, the diseased and everted mucous membrane of the eyes — for both the external and internal mucous membranes were attacked — the baldness, alternating here and there with thin, wooly hair, all produced a peculiarly frightful appearance. Besides these were teeth, filthy, if they had not fallen out, foul breath and salivation, a dragging, sluggish gait, melancholy, irascibility and a sexual desire not much increased. This condition might be prolonged from six months to two years. Then most of the knots, after they had softened singly or together, broke open, giving rise to round, foul-smelling, leprous ulcers, with yellowish-red bottoms. The nose sunk in, and with the fixed stare gave to the face a leonine appearance. The condyles became corroded, as well as the privates of men and women, and in the latter a foul discharge was produced. The internal organs also ulcerated. No wonder that all the world shunned these unfortunate beings and separated them from other society, especially as the disease was contagious, though not very markedly so. But dread of the hideous disease exaggerated the danger to the healthy!

If a sick person was known to be leprous (for the decision of which question certain individuals, often themselves leprous, were appointed), he was secluded — often with preceding religious burial rites — in great hospitals, leper-houses, infirmaries, lazaretti,[1] outside of the cities and villages, or in separate cottages in the open fields. The mania of the period to form regular associations, as well of those united by similar diseases as of those bound by similarity of feelings, may have also influenced the lepers to an isolated life. Thus, in accordance with the feelings of the age, a meritorious work might be accomplished, by which one might guide himself toward heaven, so that leprosy, bad as it was for the present world, might seem even profitable for that which was to come. Members of the religious orders took care of the sick. The latter were permitted to go abroad in a peculiar dress only, a black gown with two white hands sewed upon the breast, and a large hat with a white band upon the head. Whatever a leper wished to buy he could only point out with a long stick, drawing it to himself therewith. Even his approach must be indicated by a rattle. As far as concerned civil affairs the poor wretch was dead, buried to his friends, to his wife and children, to the community, to the state.

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[1] Leper-houses are mentioned by Gregory of Tours (about 560), and under king Pepin (757) leprosy was made a legal ground for divorce. In France under Louis VIII. (1223-26) there were no less than 2000 leper-houses, 19 in the single diocese of Troyes. (H.)

About the year 1000 the number of lepers had begun to increase enormously, until in the 13th century it attained its greatest height. From this time onward a gradual decrease set in, until in the 16th century the leprosy — and with it the number of leper-houses — dwindled into insignificance. According to accounts the disease first appeared in Germany in the 7th century. It disappeared earliest in Italy, then in France, and last in Holland and North Germany. At least it shows itself very rarely still it Italy, though more frequently in Scandinavia and Spain.

Among the early epidemics of the Middle Ages — from the 9th to the second half of the 14th century — belongs also the so-called Holy-fire (St. Antony's fire, Fire-plague, with many other similar designations), which we understand as ergotism.[1] Its consequences were, if possible, still more terrible and horrible than those of the leprosy; for it maimed horribly those who did not die, deprived them of a hand or a foot, or both together, and though it did not increase the suffering, yet it did, indeed, aggravate the disconsolate and mournful appearance of the victim, when it removed arms and legs together, so that often, when it destroyed other conspicuous parts, literally only the body with the head remained. The most miserable victim then cried fruitlessly for a death which could not be granted him. The disease began with an icy coldness of the skin, most frequently on the limbs, followed gradually by a burning fire within which consumed the flesh from the bones, accompanied with frightful pains and lamentations on the part of the sufferer. Sometimes discolored blisters first rose upon the skin. Then, generally, however, without the previous occurrence of the blisters, appeared a discoloration of a limb, which either shrivelled away to a black, dry mass, or, diffusing an unendurable odor, became a stinking, moist, gangrenous mass, in both cases finally falling off from the body. In this terrible condition many recovered. In other cases the internal parts were first seized and the gangrene ransacked the viscera, torturing the poor wretches irremediably. However, those in whom the viscera were fortunately attacked first, died speedily. Epidemics of this kind, which never ravaged very extensive tracts, prevailed occasionally in England and Spain, but especially in France, Alsace and Lorraine.

In the fermenting period of the Crusades there was also separated from the general domain of disease a new, acute and peculiar form of disease, the Scurvy, which from that time remained naturalized, until in more recent times it has yielded to the higher development of external life and its means of assistance. The first undoubted descriptions of this disease spring from the Crusade of St. Louis (1250). But in the 15th century, with the more frequent and longer sea voyages, it became first distinctly marked and diffused. Especially was this the case on occasion of the voyage of the immortal Vasco di Gama in the year 1498, when 55 sailors died of the disease.

Next followed the observation for the first time of the Plica Polonica, a disease which had existed in Poland from the year 1287, after an invasion of the Mongols, and was a product of mediæval filthiness among an especially barbarous people.

The existence of epidemic Influenza in the earlier ages (whence comes our "God help us", uttered after sneezing, because those attacked died too quickly to expect aid from human means), as well as in the last half of the Middle Ages, is indeed highly probable, but not certain, since the descriptions of the disease are too ambiguous to decide the question. The same is true of Hooping Cough, Scrofula, The Purples and Rheumatism. On the other hand the Gout was already known to

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1. The earliest epidemic recorded in France occurred in 590. The identity of the mediæval ignis sacer, ignis St. Antonii, with our modern ergotism was first established by Read, a physician of Metz, in 1771. The Order of St. Antony, designed especially for the care of sufferers from the ignis sacer, was established in 1093. (H.)

the Byzantine physicians, and was described as an every day affair in the compendiums of the 14th and 15th centuries.

Less frightful and terrible in the appearance of individual cases, but incomparably more terrible in the rapidity and universality of its diffusion over the whole earth, as well as in the inevitableness of its attack and the unavoidableness of the death of the sufferers, was "The Great Death", "The Black Death", which raged from the year 1348 onward. It is also distinguished by the enormous resulting mortality, which attained figures never heard of before or since that period. In Europe alone 25 millions of human beings perished, in the East 23 millions, and in China 13 millions. No less mournfully characteristic of the animal nature of the human race, which, in ordinary periods repressed for the most part by powerful laws and customs, yet breaks out in a bestial manner in extraordinary times, was this fatal plague.

Before and with it are said to have appeared the phenomena noticed in all great epidemics, and reported from that day to this of all momentous events. Some of these were accurately recorded only because of the search after a cause for the visitation, and were willingly referred by childish persons and impostors to the punitive will and avenging power of a deity: or they were forced into a connexion with present or past misfortunes and often exaggerated strongly by over-excited fancy, or were simply delusions of that fancy. Such phenomena were the sinking of mountains, earthquakes, great storms, inundations preceded or followed by drought, wide-spread dearth and want, failure of crops, new phenomena in the skies, comets, poisonous fogs, swarms of grasshoppers etc. — phenomena which are in part the natural consequences of public and great misfortune. Höniger ("Der schwarze Tod in Deutschland", by Dr. Rob. Höniger, Berlin, 1882) regards most of them as later creations of the fancy.

Under the form of the Black Death such an epidemic as had never before been experienced overran Europe, after devastating the whole of Asia, from China to the Caucasus, as well as Africa. In the single city of Ghaza there died in one month 22000 persons; in the whole East 23 millions. The Arabian physicians who give an account of the Black Death estimate the number of its victims at two-thirds of the number of persons living at that time. From the Crimea the plague spread after 1347 to Constantinople, Greece and Italy, where it arrived in 1348, speedily extending over France, Spain, England,[1] Norway, Denmark and Holstein. It even reached Greenland as well as Iceland in the same year, both of which countries of the extreme north, heretofore very populous, were then almost depopulated. By another route the Great Death (which had already in 1348 once visited Germany, coming from France through Alsace) again spread from Carinthia and Vienna in 1349, destroying on the whole a million and a quarter of human beings. Poland too was not exempt (according to Höniger, however, it with Silesia, Bohemia and eastern France, remained exempt for at least the first three years), and even Russia, in spite of its northern situation and colder climate, was subjected to its ravages. Hence it no longer appears remarkable that even the lofty valleys of Switzerland, especially of Valais, were thoroughly scourged, so that Lucerne lost 3,000, Basel fully 14,000 men. Strassburg, however, lost 16,000, Dantzig 13,000. Vienna 40,000, Schleswig four-fifths of its inhabitants, Paris 50,000, London quite 100,000 souls, a mortality equalled by that of the then so populous Venice. The death rate was also enormous!

In the earliest epoch almost all those attacked died, a number amounting to two-thirds of the total population; in 1361, however, while about half of the population was attacked, a great number still died; at last only about one-twentieth of the population was attacked (1382), and, as is usually the case in all epidemics, only a few succumbed. On the whole, however, the fourth part of mankind then existing was swept off by the disease! Its course was often fatal in a few hours; more frequently between the first and third day. Death might, however, ensue after weeks, though, when suppuration of the glands set in, recovery most frequently followed. Epistaxis at the beginning was of evil omen in eastern countries; in the West however, sudden paleness preceding the outbreak and vomiting of blood soon after bore the same import. Insensibility was also dangerous, and from it very few awakened, and these too often only to die immediately. Gangrenous-bullæ and numerous petechiæ were of bad omen. Most frequently the direct cause of death, besides the immediate active and powerful "infection of the blood", appears to have been gangrene of the lungs. From this also proceeded the foul breath, in addition to which loss of sensation and of voice speedily showed themselves. Next followed paralysis and insensibility. Before and during all this period high fever, thirst, pain and sleeplessness consumed the strength of the patient, and (when time for their development remained) bubos in the axilla and groin were associated therewith. The latter, however, often appeared in the beginning, followed by a dry and brown tongue and black spots upon the skin. The urine also was often black. The phenomena varied, however, in accordance with the period of the epidemic and its location, so that the symptoms mentioned are likewise variously recorded.

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[1] The "Black Death" made its appearance in England in August 1348, reached London about the first of November of the same year, and continued to rage for about a year. During its prevalence even the sessions of Parliament and of the courts of justice were suspended. (H.)

Still more terrible, however, was the condition of public and private morals following and growing out of the enormous mortality. In considering this we must take into account the superstition and universal barbarity of the time, and the general desperation. Beside the innumerable examples of the vanity of all things earthly, placed daily and hourly before all eyes, was exhibited the lowest avarice; and beside this again as a contrast, was displayed a corresponding squandering of earthly possessions in mortmain gifts. For in this way it was believed that one might escape judgment, and hence it resulted that, in a period when all others were losers, the Church alone gathered in fabulous wealth. Moreover the bonds of blood and of friendship were severed, since where help failed all, each one cared for himself only. At last the dead were laid in rows and ranks in common graves, "careless of a spot for the memory of the departed". Some in pleasure led merry banquets and dances; others in sorrow prayed and fasted, while others still, in gloomy indifference, dared every danger. Licentiousness, however, celebrated its open and secret orgies, and put to flight corruption, and suffering, and despair, and fear, in the absolute certainty of ruin. Pilgrimages met carnival processions, and from the latter the crazy penitential dances were often difficult to distinguish. No commands were longer obeyed; public safety was wanting for both person and property, and the mighty mob, even while the majority were sinking into death, practised robbery, murder and rapine. The Jews, however, accused of poisoning the springs of water,[1] were in many places systematically murdered, or induced to sacrifice themselves (in Mayence alone 12,000 of these persecuted creatures threw themselves into the flames!), since their avarice[2]

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1. This mediæval idea too has not disappeared everywhere, even at the present day, though we do not accuse the Jews alone. They are persecuted out of a vague hatred, as e. g. in Russia, Hungary and North Germany in 1880-81. In Spain and Sicily, however, in 1885 even the physicians and nurses were accused of poisoning, and maltreated accordingly.

2. They took interest (often usurious), which was forbidden to Christians, and had in their hands banking in general — the only business, except their ancient occupations, which they were permitted to pursue.

brought upon them the suspicion that they were responsible for the plague — a suspicion in which religious hate and the prejudice of race naturally played their part. Yet happily there were also heroic deeds of self-sacrifice, both on the part of numerous members of the yet undegenerate religious orders, especially the Franciscans and certain associations of women, and likewise on the part of physicians, of whom a large number, led by the most capable, with cheerful self sacrifice sought to render aid and — succumbed to the plague. For no means were of any avail if nature would not assist. Besides foolish medication and superstitious remedies, an earnest application of hygienic measures, such as isolation of the locality etc., was also employed.

After the cessation of the plague, however, the already mentioned internal evils came more openly to light, and to these were added the external ills of want and distress among individuals; for no one had tilled the fields, nor would they sow them now for even high wages;[1] so that this resulted in universal poverty. Yet the priesthood had, on the whole, gained in power and influence!

After the extinction of the plague, however, a greater fruitfulness among women was observed, so that a surprising number of twin births occurred (Hæser).

As evidence how a greatly overstrained, one-sided devotion (possible only to those deprived of the exercise of the powers of reason) led minds into false feelings, madness and insane practices, as well as how this one-sidedness exaggerated at first the lower impulses, until, no longer controlled by habit and law, they finally changed into open and shameless debauchery and sensuality, we may adduce not only the unexampled and universal immorality, which in these highly devout times ruled both the laity and clergy, but we are also in a position to show in particular from these psychologically remarkable ages, the concomitant and succeeding results of devout frenzy and immorality. First with reference to the Geisslern or Flagellantes. These we may define as those penitents, who, for the first time in 1260, attacked by religious frenzy, for their own justification and purification before God and to awaken repentance and contrition in others, set out in multitudes to scourge themselves from time to time, or to suffer themselves to be whipped by a president or other associate, until their bodies were full of bloody stripes, so that their bare appearance excited compassion. These lunatics sang continually hymns of penitence, and their expeditions are said to have lasted thirty-three and a half days. Their sanctifying procedures took place at first in the churches, later, however, before the walls of the city and in the open fields, and finally at night, something like the extravagances of our "Salvation Army". These epidemics were repeated several times, until in the year 1349, shortly before and during the plague (and only aided by the outbreak of the same), they manifested themselves in the greatest number, so that hundreds and even thousands of such lunatics, at first divided into sexes, gradually in mixed trains, roved about, especially along the Rhine. They wore only a shirt, a hat with a red cross, and a mask. "These crazy Flagellants roamed about half naked, scourged themselves by day, and by night held lewd assemblies." Thus gross immorality developed out of religious insanity, with manifest results as regards the female participants. At last the Church (though otherwise very indulgent at this time towards such excesses of religious principle) saw herself compelled to oppose this public scandal.

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[1] According to Green the close of the epidemic of the "Black Death" marks the beginning in England of the chronic strife between capital and labor. The "Statute of Laborers", which provided that "Every man or woman, of whatsoever condition, free or bond, able in body and within the age of threescore years . . . and not having of his own whereof he may live, nor land of his own about the tillage of which he may occupy himself, and not serving any other, shall be bound to serve the employer who shall require him to do so, and shall take only the wages which were accustomed to be taken in the neighborhood where he is bound to serve" two years before the plague began — was passed toward the close of 1349. (H.)

A similar development, based on the same ground, manifested itself in the "Dancing Mania", which raged like a sort of epidemic dervish-frenzy, in 1021, 1278 and 1375.[1] Thousands, at this period, danced frantically until the foam gushed from their mouths, convulsions made their appearance and the belly swelled up immensely, which latter symptom was relieved by bandaging the abdomen and belaboring it with kicks. At last the dances took place among ranks of both sexes, and for some time the maidens had to bear the frequent results of this mania also. Later, in the 15th century, a few such maniacs still showed themselves. As St. Vitus was their patron, the title of "St. Vitus's dancers" was given to these maniacs, whence our "St. Vitus's dance" of to-day has received its antiquated name.

Religious mania, however, worked its most mournful results in the phenomena distinguished as "Childrens' Pilgrimages" (Kinderfahrten). Boys and maidens, all of them under age, infatuated or deluded, set out in hosts to the number of 30,000 for the purpose of taking possession of the Holy Sepulchre. In 1212, carried away by a power so resistless that those detained against their will often sickened and died, these mixed bands for the first time in thousands broke away to the sea, led by one of equally immature years. None attained the object of the expedition; few only returned to their homes. Many, after the loss of discipline which had been at all times very loose, strayed about aimlessly in the greatest misery. Many of the girls especially, scarcely beyond the years of childhood, whose pregnancy had been acquired in these expeditions resulting from insane religious over-excitement, awakened, instead of pity, only scoffing.

Such epidemics of religious frenzy (among which must be included the burning of Jews, "Judenbrände", especially in the years 1348–'50) thus worked at once in the body and soul of their victims results equal to those of the plague — death and moral corruption.

With the mania last mentioned we may close the list of public and epidemic corruptions of the faith during the last half of the Middle Ages. "Thenceforth, the 'Black Death', flagellation and the murder of Jews at an end, the world began to live and to be happy." But the physical corruption was not yet terminated.

Next is to be mentioned the "English Sweating Sickness", so called because it always made its first appearance in England (for the first time in the year 1486).[2] It began with a feeling of great lassitude, often ending in trembling and a single chill. Soon appeared unutterable anguish, burning sensations, pain in the region of the stomach and loins and unquenchable thirst.

From the outset, however, a severe sweating which consumed the strength manifested itself, accompanied, or more frequently followed, by a miliary eruption. These were followed by unendurable headache, and extremely troublesome palpitation of the heart, frequently by delirium and sopor, to which the sick succumbed unless they could be awakened therefrom. The disease caused death most frequently within the first 24 hours. If, however, death did not ensue, a change for the better

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1. A similar outbreak of epidemic chorea following intense religious excitement appeared in Kentucky and Tennessee in 1803, and was described by Dr. Felix Robertson in 1805. (H.)
2. The "Sweating Sickness" prevailed epidemically in England in 1486, 1507, 1518, 1529 and 1551. The last epidemic was excellently described by Dr. John Kaye (Caius) in 1552. (H.)

set in speedily, though before complete recovery 8 to 14 days always elapsed. — The first epidemic extended over England only, as did the second likewise (1508); the third, however, extended also over northern France (1518); the fourth (1529) over Germany, the Netherlands, Sweden, Russia, France and Switzerland; while the last (1551) affected again only England proper, excluding Ireland and Scotland. The mortality occasioned by these epidemics was enormous, since in the beginning not one in a hundred escaped death. In Hamburg, at a later period, when the plague had already become milder, in 22 days over 1000 persons died; in Augsburg of 15,000 sick 800 died in the first five days after the appearance of the epidemic, while later of 3000 attacked 600 died. In Germany the sudorific treatment originally practised was responsible for a large share of the high mortality,[1] which diminished as better physicians, after the English method, maintained the sweating gently and for a brief period. "Why should the sick man sweat 24 hours without intermission, as if he were a horse or an ox?" said one of our true-hearted and honest forefathers!

While the English sweating sickness, and most of the mentioned epidemics which the Middle Ages matured have again forsaken us, the case is far different in respect to syphilis, which speedily became the most active opponent of Galen and the Arabians, since they no longer sufficed to meet the new disease. That this disease is as old as the Bible is in the highest degree probable, since something very similar to it is mentioned in that book. We also find it delineated with tolerable distinctness by the physicians of the Greeks and Romans. Pliny with a sigh even exhibited to his wife his ulcerated member, and did not believe that it could be healed — a beautiful picture of marital consideration! However a knowledge of the causation (first recognized by a few physicians of the last period of the Middle Ages to depend upon impure intercourse) was wanting to all, as we have already seen. We have very early accounts of diseased royal, and more especially clerical, members. Palladius (367–431), a priest of Helenopolis, already relates a story of a monk Heron who was infected by a dancing girl with whom he had gone astray, and Sir Astley Cooper called attention to cases even out of the Acta Sanctorum (1010). So too bishop John of Speyer, after he had been long sick, died in 1104 of an ulcer of the penis "from which a by no means good odor proceeded", and even in the 16th century the clergy carried about syphilis and gonorrhœa from one woman to another. As early as the years 1354 and 1361 the city physician of Frankfort-on-the-Main received a salary for examining impure woman (Kriegk). Yet syphilis is said to have made its appearance here for the first time in 1496, in spite of the fact that during the Middle Ages hosts of wenches profited by the mass and coronation ceremonies to ply here their libidinous trade. In 1394 there were no less than 880 of these women in the city, and a gentleman of the old school wished his friend more luck than there were prostitutes in Frankfort — nice times these were! It was declared in verse of king Wenzel that he was presented with a disease by his beloved Agnes:

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[1] We find even to-day among the common people on the Rhine the greatest fear of "der Schweissfriesel", so that it is not prudent to mention the name at the bedside. Since the miliary fever of the present day is usually quite harmless, we must conclude that among the masses (as is so often the case) a knowledge of the great danger of the earlier epidemics has been preserved in the form of this dread. Other views of the common people also admit of an "historical" explanation only; almost all, however, depend upon the unconscious tradition, so to speak, of earlier, and especially of mediæval occurrences and medical doctrines. Thus the statement, often heard among the laity, that the human stomach is precisely similar to that of the hog, undoubtedly springs from the time of animal anatomy.

"Daz er davon muest sterben
Wenn er faulen pegann
An der stat, da sich dy Man
Vor Scham ungern sehen lan." [1]

In 1472 the disease, in witness of its origin, already bore the name "die Franzosen", a title which it has retained among us up to the present time. In charming and golden Mayence a chorister (again a cleric) was, even at that time, excused from service since he had the "mala Franzosa". Somewhat later (1488) a Spanish physician named Peter Martyr commiserated very heartily a professor of the Greek language "because he has caught the peculiar disease of our (that) period, which in Spain they call Buba, in Italy the French disease, and which some physicians call elephantiasis, others, however, differently". After the disease first appeared in an apparently epidemic and manifestly contagious and virulent form in the last decennium of the 15th century, an effort was made to fix a definite period for its origin. Hence one nation shifted the paternity of it to another. One threw it upon the Indians, another upon the Maranen,[2] another upon the Africans etc., and at one time the year 1490, at another the year 1492, then 1493, 1494, 1495 and 1496 was pointed out as the year of its origin. Between 1494 and 1496 the "French disease" or "St. Job's Evil" was described in Italy as a new disease, which was only rarely fatal, and on post mortem examination displayed internal ulcers (visceral syphilis). Men acquired it from impure women (Dr. C. Quist, Virchow's Archiv, vol. 64). The most frequent view, however, is that the disease first assumed an epidemic form before Naples, in the year 1495. Thence it extended over the south-west of Europe, continuing to diminish in its progress until about 1516, when another period of increase and decrease began, in which exostoses and warts were observed. Again a third period of exacerbation and remission continued from about 1526 until about 1540, in which buboes and alopecia were noticed. A fourth period extended from the latter year until 1550, in which syphilitic gonorrhœa — male and female genital discharges were already known — made its appearance, while gummata disappeared. From that time on the disease acquired by degrees its present form. The first writer on syphilis — 1494 or 1495 — was Conrad Schellig, a professor at Heidelberg. He was followed by Sebastian Brant (died 1520), the author of the "Narrenschiff"[3] The symptoms with which the disease manifested itself were as follows: general malaise, with weight and pain in the head and a strong eruptive fever, first noticed anew in the present century. These were followed by sweating, or more frequently a pustular or vesicular eruption on the male or female privates, passing quickly into ulceration. The two latter events might also occur in other portions of the body at which an infectious contact occurred, and were not excited simply by sexual intercourse, for the contagium was very active. After the continuance of these more local symptoms from a few days to weeks, a general eruption was developed, at first mostly upon the face and head, then over the whole body. This at all points quickly passed into terrible ulcerations, penetrating the muscles and even the bones. Before, during, or after the eruption and the ulcers of the skin, appeared also severe pains in the bones, especially at night, followed later by gummata, nodi or tubera, terminating in caries or necrosis. Besides the skin and bones the mucous membrane of the mouth and throat were very quickly and often terribly corroded, so that death not infrequently resulted therefrom. Next appeared affections of the eyes to close the disease. The plague was often quickly fatal; usually, however, it occasioned death after months and years of horrible suffering.

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[1] That he thereof must die,
When he began to mortify
In the place where every man
Is loth to show himself for shame. (H.)

[2] Clandestine Jews (always the Jews!), who were banished from Spain in 1492. See Hæser, vol. III, p. 236. (H.)

[3] Hæser says the earliest work on syphilis was the "Vaticinium in epidemicam scabiem" of Theodore Ulsen, dated August 1, 1496. This was followed in the same year by the works of Brant and Joseph Grünpeck, after which came the "Salubre consilium in pustulas malas etc." of Schellig. (H.)

The disease was at that period so universally diffused throughout Italy, that even the "most respectable" persons were affected. At the head of these was Charles VIII., king of France, and of course pope Alexander VI.— his ordinary physician in venereal matters was Caspar Torella, a bishop! The pope, at all events, was not infected at a distance by a venereal miracle ad hoc, nor his whole posterity, the notorious Borgia family. The disease was diffused throughout the greater part of Europe by the numerous soldiers returning to their homes. Thus it was early naturalized in Germany, where it was called Bos-Blattern, Lembt der Glieder. As early as 1494 it prevailed in Poland and Silesia, especially again among the clergy, whose secret sins it thus brought to light. Alsace was in like manner at once attacked, then Swabia also, and as early as 1495 the edict of the emperor Maximilian, already mentioned, calls the new "French disease" a punishment from God. It reached England and the Netherlands in 1496, Friesland in 1498 and at a later period Russia also.

After its appearance, the people, influenced by astrological superstition, assigned as the cause of the epidemic and contagious venereal disease sometimes the conjunction of Saturn and Jupiter, sometimes that of Saturn and Mars; then two eclipses of the moon, one of which took place in the sign of the Bull, the other in that of the Scorpion. The bull indicates the throat and the Scorpion the sexual organs, and thus were designated by the heavens the principal places in which the disease made its appearance. Among the conjunctions the most probable cause seems to have been that of (the disciples of) Mars with (the very numerous priestesses of) Venus.[1] A second theory ascribed the disease to local causes merely; another considered it a transformation of the leprosy; again another referred it to an importation from Africa and America; lastly it was considered a disease known to Antiquity and long existing, but raised to an epidemic under especially unfavorable conditions, and then naturalized. The latter opinion is most probable, for in the last decennium of the 15th century, and especially before and during the campaign of Charles VIII. (1495), unusual heat prevailed, alternating with inundations, failure of crops and famine, and, over and above these, was collected together a soldiery of the very worst kind, a mixture of all people and of many races, which, in conformity with the horribly barbarous customs of the "Landsknechte", after severe hardships and the worst privations, in a period of temporary abundance rioted and rolled in the deepest mire of beastly lust. It may be remarked also that the then "modern" syphilis at first involved nothing injurious to one's reputation, but was regarded, like any other disease, as a misfortune. This idea was held even as late as the 16th century, in fact, as Proksch, following Erasmus of Rotterdam, relates, a man who had not had the disease at least once was regarded as boorish and no gentleman! Nothing certain was yet known of its specific cause and occasion, but syphilis was looked upon as a new (as we would say miasmatic-contagious) disease, whose origin was referred to its descent from the liver into the genitals etc. — in accordance with the contemporary theories. Perhaps the general and extreme tolerance of the Middle Ages in

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1. The linen shirts, which at that period began to supplant woolen garments, were also considered to promote the extension of the disease.

sexual matters particularly may have had something to do with this charitable conclusion; for purity of morals, especially among the higher classes, was during this period a rare phenomenon.

6. THE MEDICAL PROFESSION DURING THE MIDDLE AGES, ESPECIALLY IN THEIR LATTER HALF. PHARMACIES AND OTHER INSTITUTIONS FOR THE SERVICE OF THE SICK.

The relations of the medical profession, especially in the last half of the Middle Ages, its culture and position with respect to private individuals and to society, differed in very many respects from those existing both earlier and later, and therefore offer especial interest.

Above all there developed, in accordance with the greater number of nations now entering upon cultivation and with the grades of general culture, prosperity etc. to which they had attained, more distinct characteristics, and thus a greater multiplicity of conditions, than had appeared among the Ancients. Then the clerical element at this period was, it is true, still predominant in medicine just as in all other sciences and arts, e. g. architecture, painting etc.; still the secular element again manifested itself in a higher degree than was the case during the first half of the Middle Ages. Physicians for the so-called common-people continued, indeed, to be "for the most part monks, who troubled themselves little about the advance of medical science; physicians out of self-interest, who stained the god-like art with superstition" — yet not they alone, for lay practice too was prone to the latter. The Church had taken possession of medicine, ostensibly to exercise and develop it only for the glory of God and celestial profit, but in fact chiefly for earthly lucre. It thereby occasioned not only the total separation of surgery and medicine, but likewise gave rise to a totally distinct medical and surgical faculty, with numerous subdivisions of the latter. Moreover the separation of pharmacy from the duties of the physician, which developed rapidly towards the end of the Middle Ages through the agency of the apothecary-shops, new to the West, introduced a different type of practice from that which prevailed when physicians also regularly devoted themselves to the preparation of medicines. It was, however, the guild-system (borrowed from the Romans) which characterized most forcibly the practice of the last half of the Middle Ages — a system which manifested its peculiar influence as well in the privileges of the universities, their grades and honors and their guild-like curriculum, as in the concession of the exercise of higher i. e. internal practice awakened thereby. This influence was displayed too in the genuine guilds of the surgical faculty, so lightly esteemed by the physicians and scorned in civil and political life as followers of a dishonorable "trade" and therefore themselves "dishonorable". Besides the latter, all sorts of empirics and empiric families carried on business as "Irregulars", and thus a luxuriant and grotesque charlatanry grew up, which disgraced practice from this time forward down to the last century — and in some lands to the present day.

Medical instruction, as we have seen, was imparted in the early portion of the Middle Ages by individual physicians, as in Antiquity, and especially by clerical physicians, as among the Benedictines. At a later period instruction was given in the monastic schools, where medicine was taught under the title "physica", a designation which proved permanent. Besides this, private study of the writings of actual and (for the time) capable physicians contributed to the knowledge then required.[1]

After the year 1000, however, secular or semisecular faculties — there were also married clerics — stepped freely into the foreground, as at Salerno and Montpellier. These faculties imparted theoretic instruction exclusively, in accordance with a regular curriculum, while practice was learned from a practising physician. Besides physicians proper (after the idea of that day, a conception preserved down to the present century), these institutions of learning formed also surgeons of the higher and lower classes.

Although these colleges were not originally recognized as state institutions of learning, yet a complete course of study there gave to the physician increased reputation from the guarantee thereby afforded of the attainment of medical capacity and maturity. This was accomplished in a still greater degree when Salerno was raised by Roger and Frederick II. to the position of a legal place of examination, as well as an educational institution authorized by the state.

The universities proper, which, however, devoted themselves to teaching simply, not to independent investigation, and whose rigid curriculum did not differ greatly from that of Salerno, soon stepped into the place of these schools. Down to the close of the Middle Ages, or more accurately down to the Reformation (which introduced Protestant universities), their privileges were granted almost exclusively by the pope. Subsequently these were granted chiefly by the sovereign or the state. The universities gave to the cities in which they were located much of their importance. Not infrequently, in consequence of dissensions with the city or state authorities, they migrated in toto, professors, students and paraphernalia, to some other place, even to distant cities, an exodus of which our modern

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[1] Daremberg gives us an inventory of the books left by a canon of Paris in the beginning of the 15th century before the invention of printing. They are not so very few: I have seen far smaller libraries among physicians of the present day: indeed, with a country practitioner I once found upon a small wooden table, besides some knick-knacks, five medical works. The canon's library contained a part of Avicenna, Isaac, the Lilium medicinae, Rosa Anglica, Passionarius, Hippocrates' Aphorisms, John of St. Amand, Rhazes ad Almansorem, Gariopontus, Mesuë, Averrhoës, one book of Galen, Serapion, Lanfranc, William of Salicet, the Tacuin and a few others. The library of an apothecary of the year 1402 was not much smaller. In the 15th century one of the largest public libraries in Spain contained only 120 works. Of course the "pagan" writers — as throughout the whole Middle Ages — if not under the ban, were at least stigmatized as heretical.

"Studentenauszüge" form only a caricature.[1] Occasionally new universities or perhaps branches of an old one were thus established. In this way the university of Leipsic is due to an emigration of the students of Prague, and Padua owes its university to an exodus of the students of Bologna, while branches of the latter university were also established in Siena and Florence. Sometimes, in consequence of war or disease, an entire university removed temporarily to another place, subsequently returning to its original seat. Thus the university of Heidelberg in 1491 removed to Speyer in consequence of the plague; in 1563 it removed again to Oppenheim, in 1564 to Eppingen and in 1694 to Frankfort and Weinheim. The universities were originally free and voluntary associations of teachers and students. The earliest German universities were the same, and most of them were organized after the model of the university of Paris. Such was e. g. the university of Prague, to which, indeed, the first eight teachers (among them *one* medical teacher) were called from the school of Paris. In this way Paris attained for the first time through its university great influence upon Germany. Besides the university of Prague, the following institutions were also modeled after Paris: The universities of Vienna, Heidelberg, Cologne (indirectly from Prague), Leipsic, Rostock, Greifswalde, Erfurt (largely), Louvain (through Cologne), Treves, Freiburg (from Vienna), Ingolstadt. "Some of their Statutes begin with a eulogy of their alma matter of Paris. From Paris too the whole system of Scholasticism, the quarrels between Nominalism and Realism and the predominance of the theological faculty were adopted. Bologna, the second pattern university, was taken as a model by Basle and Tübingen alone." (Ranke.) — At the outset the teachers were not divided into faculties, but the same professors lectured on medicine, jurisprudence and theology. It was only at a later period that these professors were divided into faculties, and, as a rule, the medical faculty followed long after the establishment of the faculties of theology, law and philosophy. Paris received her medical faculty in 1215, and Upsala not until 1595. All of these organized themselves into guilds, held guild-banquets and maintained guild-quarrels. There were always two (one of the theoretical, and one of the practical branches), more rarely three or four, of these teachers, of whom the professors of medicine lectured also on botany etc. So also the teacher of anatomy (included in the curriculum from the time of Mondino, and practically demonstrated by dissections, especially in Italy and France) often made sport of the teacher of botany, the teacher of botany of the professor of physics etc., just as the medical professors do to-day in very many universities, though we profess to have long outstripped the Middle Ages. One of the chief means of instruction were the disputations between the students, in which they were expected to prove their knowledge and dexterity in repartee. Besides these ordinary scholastic and Arabian polemics there was arranged each year a general "grand debate" (disputationes de quolibet). This, however, finally degenerated, so that at last provision was made for the jests of the listeners and the participants by a "disputatio de quæstionibus miris principalibus", marked by wit and obscenity. This custom was prohibited at Heidelberg for the first time in 1518. The students united themselves, for the most part in accordance with their nationality, into so-called "Nations",[1] which, however, did not contain exclusively representatives of the nation from which they derived their names, though these, of course, formed the chief contingent. These "Nations" had their special assembly-rooms, their own property, and when necessary supported their own members etc. There were many establishments, so-called "bursæ",[2] where students received board and lodging, or the former only, if necessary free of expense. The preliminary education was also obtained at the universities (as in English universities of the present day), and within the philosophical faculty. Of course holidays and vulgarity were not lacking. In Italy the carnival was an especial occasion of festivity, and notorious for its rudeness. The number of students was relatively very large. While the most popular German universities, Vienna and Berlin, had, the former (in 1883–84) 5,221 students, and the latter (in the summer of 1884) 4,154, Oxford in 1340 is said to have had no less than 14,000, Paris, about the close of the 13th century, 12,000, and Bologna, though attended chiefly by students of law only, is said to have had 10,000. Of course there may have been among these students numerous learned vagabonds, of whom there was at a later period such a host under the title of "travelling scholars" (fahrende Schüler), but yet these numbers are astonishing, even if we admit that some exaggeration and incorrect figuring (university-statistics, which here and there also to-day smack somewhat of watering-place statistics!) may have crept in. Complete liberty of removal from one university to another (Freizügigkeit) was permitted to the students, and the grades of domestic and foreign universities were everywhere regarded as equivalent.

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[1] Such an exodus from Oxford occurred in 1209. Three thousand professors and students withdrew to Cambridge, Maidstone and Reading and continued absent for five years. In modern parlance Oxford was "boycotted". (H.)

The teachers for a long period received no salary — except at Salerno, where they were paid from the outset. They depended upon the receipts from benefices, their lectures, their examination and graduating fees and their practice alone. Many of them, in consequence of the small profit of their teaching,[1] if they were not already bishops or arch-bishops also, occupied the office of ordinary physicians to one of the greater or lesser potentates (at that time as numerous as vermin, particularly in Italy), or they filled the position of city physician. In somewhat later times the professorial salaries, however, were sometimes tolerably high, as at Pavia in 1399, 171 lire[2] per month, though others, on the contrary, received only 22, or even 4 lire. One of the professors of medicine at Tübingen in 1491 received an annual salary of only 171 marks (about $43), and the other only about 140 marks ($35). The highest salary was paid to the professor of jurisprudence, who received 205 marks (about $51). These professors too, in a memorial to the Reichstag at Rottenburg, called themselves "poor fellows". In Montpellier until the 15th century the professors were dependent upon their honoraria. Of the two professors of the medical faculty, one was its dean. Assistants to the chair of the professor were found in the baccalaurei, licentiati and doctores. Bologna in 1451 had no less than 170 professors. Papal bulls determined the text-books. Thus e. g. such a bull in the 13th century designated the "Aphorisms" of Hippocrates, his "De ratione victus in acutis", the treatise of Theophilus "De corporis humani fabrica", Honain and Ægidius of Corbeil. These designations continued in force far into the following ages.[3]

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[1] In the University of Paris there were four "Nations": that of France, which included the bishoprics or metropolitan provinces of Paris, Sens, Rheims and Bourges, with all southern Europe (Spain, Italy etc.); that of England, including the British Isles and all northern and eastern Europe; the Normandy nation, confined to the province of the same name; and the Picardy nation, representing the dioceses of Beauvais, Noyon, Amiens, Laon and Térouanne or des Morins.

[2] From these arose the modern term "Burschen". The "landsmannschaftlichen Corps" of the present day, e. g. "die Rhenanen", "die Westphalen" etc. are descendants or relics of these "Nations". The "Colleges" and "Halls" of the English universities are the sole remains of the mediæval "bursæ" and preparatory schools.

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[1] Complete freedom in the choice of teachers prevailed, so that the students were not confined to any one university and thus had their teachers materially in their power, particularly as the latter were formally chosen or accepted by the students.

[2] A lira at present is worth about 19 cents. (H.)

[3] What were at least the popular medical authorities in England during the 14th century may be gathered from Chaucer's "Doctour of Phisik":

"Wel knew he the olde Esculapius
And Deyscorides, and eek Risus (perhaps Ruffus)
Olde Ypocras, Haly and Galyen,
Serapion, Razis and Avycen,
Averrois, Damascien and Constantyn,
Bernard and Gatesden and Gilbertyn."

Hæser furnishes us with the following programme of the curriculum at the university of Leipsic about the same period:

HOUR.	FIRST YEAR.	SECOND YEAR.	THIRD YEAR.
6–7 A. M.	First canon of Avicenna with the explanations of Jacob of Forli.	The "Ars parva" of Galen, with the exposition of Torrigiano.	The "Aphorisms" of Hippocrates, with the commentaries of Galen and Jacobus.
1 P. M.	Book IX of Rhazes ad Almansorem, with the exposition of Arculanus.	First fen, fourth book of the canon of Avicenna.	Fourth fen, 1st book of the canon of Avicenna, with the commentary of Dinus de Garbo or Hugo.
3 P. M.	The "Doctores" read some work aloud, in this "semester" the "Prognosticon" of Hippocrates.		

The programme adds: "Anatomia seu corporis insectio singulis annis, corpore

The legal age for entering upon the office of teacher — as well as into actual practice — was the 21st year, and, besides other qualifications, in those prejudiced times legitimacy of birth was also required. This was a question (often rather critical in those days), the answer of which belonged properly rather to the father or mother of the party concerned than to the student himself. Permission to teach was at first free to all; then it was granted or sold by the chief magistrates, the Faculty or University. It was not until later, when great abuses became practised in connection with this power, that the privilege was associated with a definite examination or a fixed term of study. Thus any person after three years' study at Paris could impart instruction in the elementary branches, though he could not practice, and then bore the title of Baccalaureus (Bachalarius). After three years more he became a "Magister", particularly a "Magister in Physica", when he could lecture in all departments of medicine and for the first time could practice. The number of these teaching "Magistri" was often very great, so that e. g. at Ingolstadt alone in 1492 thirty such persons lectured on Aristotle. These "Magistri" and "Baccalaurei" took the place of our "Privatdocenten". The university professors, in contradistinction to the surgeons and the teachers of Salerno, during the Middle Ages were clerics, and were also condemned to celibacy — hence the long robe — unless a special dispensation to the contrary was obtained. In France they did not receive permission to marry until in 1452. After this time they no longer scorned surgery so much as before. They were classed among the teachers of the liberal arts, and were accordingly distinguished as "Artistæ", a title which still lingers among the teachers of fencing, dancing and equestrianism in our universities. There were also female teachers of medicine originally at Salerno, who, by the way, occupied themselves with a curious treatment of ulcers, for which, in consequence of the softness of their hands, they were in especial demand. "Academic freedom" dates from the year 1057 or 1055, when Frederick I. Barbarossa took the professors under his protection, permitted them to sojourn at any university and liberated the students from the jurisdiction of everyone save their own professors and the bishop.

Besides the already named grades of physicians proper — the Baccalaureus and the Magister in Physica, which latter corresponded pretty nearly to our modern "Doctor" — there was also at that period the grade of Doctor, which made its appearance in the 12th century, but came into vogue in its present sense at a much later period. In earlier times, on the contrary, it belonged, and was assigned only to teachers proper. The

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exanimi oblato, habebitur, sine qua nulla perfecta morborum et humanæ constitutionis cognitio.— Disputationis exercitium non deerit."

It will be seen that the lectures began early (6 A. M. in summer and 7 A. M. in winter), and that there were only two, or at most three, a day. In early times the students themselves selected the authors for study and explanation, but at a later period this question was determined for them by the authorities. (H.)

graduation fees almost everywhere were high, and were paid partly in money, partly in articles of industry etc., and this latter system has been preserved down to the present day under the form of obligatory presents to the examining professors. These "presents" consisted of gloves, sundry yards of cloth, hats, caps etc., and to these must be added the expenses of the doctors' banquet. Graduation at Salerno cost in money about $60; in Paris it is said to have cost as much as $1000, a colossal sum when we consider the relative value of money in those days. Originally the pope gave to the faculties the permission to administer degrees. The Paris faculty graduated a doctor of theology for the first time in 1231. After the 14th century, however, the emperor also authorized the faculties to graduate students. The Doctorate was bestowed upon "learned", i. e. internal physicians alone, and these were required to take an oath to maintain the doctrines and methods of treatment etc. which had been delivered to them (just as in Egypt). Even surgeons were educated in the schools of the earlier periods, e. g. at Salerno, and the custom of the latter school was transmitted to all the Italian universities. In Vienna too, as early as the 15th century, separate lectures upon surgery were delivered, long before this was done in any other German university. The curriculum appointed for surgeons included fewer branches and a shorter term of study than that of physicians proper, and was also characterized by the fact that, according as one wished to become a higher or an inferior surgeon, the course of study was differently framed, even in respect to the language employed in instruction and examination. This for higher surgeons alone was the Latin, while for the lower it was their native tongue. The superior surgeon only could be a "Magister in Chirurgia". In the universities outside of Italy the surgeons were not considered members of the faculty (in Paris not of the Sorbonne), but as subordinate to that body, and such was the case, indeed, from the beginning onward. Accordingly, as early as the 13th century, there developed at Paris a rival institution, the fraternity of superior surgeons,[1] which claimed the right of teaching and examination in surgery, was nominally, indeed, subordinate to the University, but was in fact very little under the control of the latter. This independence was openly manifested in imparting the grade of "Magister in Chirurgia", which corresponded to that of "Magister in Physica" and entitled the recipient to a similar dress with the latter ("Chirurgiens de la longue robe"). Subordinate again to these were the inferior surgeons, who at the outset were always instructed by the superior (and often too at a later period amid many struggles), until, in consequence of quarrels relative to rank, the Faculty, from envy and jealousy against the higher surgeons, took the lower under their instruction and protection, although the business of the latter was regarded as disreputable. As "Chirurgiens de la courte robe" they were also permitted to wear a short black gown trimmed with velvet.

In England at an early period there were schools and universities in which medical instruction was imparted. In spite of the existence of the latter, however, English physicians went, as a rule, to Montpellier and Paris: for in the English universities of that period (as at the present day) only a few lectures were delivered on the subject of medicine, while Montpellier and Paris enjoyed so great a reputation, that the number of students of the university of the latter city e. g. in the 13th century exceeded even that of the ordinary inhabitants of the city.

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[1] Or Confrérie de Saint-Côme. (H.)

Germany, besides a few physicians-in-ordinary, had for a long period no other medical faculty than the bath-keepers and barbers. Instruction in their respective arts was imparted by the skilled brothers of the trade, especially after these were organized into guilds. The regulation prevailed that no bath-keeper should take more than three apprentices. Sons of Masters of their art were compelled to undergo instruction for two years, children of other persons for four years. Their examination was often made by physicians, or at least in the presence of physicians; frequently, however, by the guild alone. A sample of work (" Meisterstück ", masterpiece), consisting originally in sharpening a knife, later in preparing certain salves or plasters, was required.

Only the higher German Wundärzte were educated abroad, and especially in Italian and French schools. So great were the sacrifices necessary to procure an education in these schools, that such surgeons are not found in Germany until towards the close of the Middle Ages, in the frontier cities Strassburg and Basel, and also in Vienna. Even then, however, they were very scarce, though, as Pfolspeundt tells us, some surgeons immigrated into Germany from Italy at an early date. Apothecaries received their instruction originally partly from physicians, partly from Masters in their department. Thus the French apothecaries e. g. in the 13th century took an oath:

> "To honor, esteem and serve not only the doctors of medicine who instructed them in the knowledge of the prescriptions of pharmacy, but also the teachers and master-apothecaries: to speak no evil of either, and to do everything which may contribute to the honor, reputation, embellishment and majesty of medicine. Also in no way to touch the forbidden parts of women, except in the extremest necessity."

This latter clause seems to hint at some very curious customs on the part of the apothecaries of those times, which are explained and authenticated still more clearly by the advice of Saladin of Asculo that apothecaries should marry early, "because in this way their youthful vigor would be curbed and they would become quiet, gentle and decorous". Apothecaries at this time (and long after) were allowed to treat internal diseases. In fact there were apothecary-surgeons etc., as in England at the present day. In France after 1336 their term of study lasted four years. At the termination of this period they were required to make a "masterpiece". Their knowledge was expected to extend to the reading of prescriptions, the comprehension of the Antidotarium of Nicholas, and the skilful manufacture of confections.

Veterinary instruction was probably imparted simply by the "Practitioners" of that branch; possibly also by a few higher physicians. So too the midwives instructed each other in their art or want of art, and at least in the eloquence necessary for teaching the aforesaid art they could certainly not have been lacking.

The body of practitioners — both practice and migration were everywhere free — was, as we have already partly seen, divided in manifold ways. First of all were the higher and lower practitioners,[1] the latter beginning with the surgeons, while the former included only the physicians. By the latter were at first understood only the numerous clerical physicians, who of course treated the sick with charms, exorcisms etc. These, as already mentioned, practised medical treatment in this period, but in general, though they professed "to interest themselves in the sick through compassion only, they yet acquired wealth by avarice and deceit", rather than treated the sick with care, so that even the Council of Vienna (1312) ordered: "In future the laity only shall superintend hospitals, in order that the sick may be better cared for." Accordingly, even at this time, there must have been "hospital physicians."

The higher physicians, who at the beginning of the 15th century began to belong chiefly to the laity, were authorized to practice all branches of medicine in all places, and were called Physici ("Puchærzte", in contrast to the clerical physicians or "Seelenærzte"), Magistri in Physica, and later Doctores Medicinæ. Until the 14th century most of them were educated in Italian or French universities, whither the Germans were compelled to go from the lack of such institutions at home, and they always practised medicine alone. Indeed this fact became so much a distinction, that it alone seemed adapted to give the higher medical rank. From the fellows of the Faculty of Paris an oath was required that they would not join the surgeons — a regulation in which malevolence and envy undoubtedly played their part! This separation was marked in the strongest manner in France, and was followed also in Germany, where the occupation of surgery made one "disreputable". This was never the case in Italy, since there many physicians, and even teachers, did not occupy themselves exclusively with medicine, but also practised surgery, in which case they had the required operations performed by assistants.[2] Clerical physicians belonged to the lower as well as the higher clergy; but those who sprung from the lower class were so ignorant that even the Church itself was forced to declare the successes of certain individuals veritable miracles, and to canonize the parties concerned. In case of the death of one of these clerical physicians — indeed with other physicians too — some writing of Galen, Hippocrates etc. was usually laid in the coffin. The practice of medicine was frequently forbidden to the monks and clergy in general (e. g. in 1131, 1162, 1212), but without doing much good. The decrees of the councils were simply ignored, even as regards surgical operations, which were most strongly interdicted. (Ecclesia abhorret a sanguine). In the ranks of the higher clergy, however, were often found well educated physicians, as well as some clerical adventurers. In the former class we may mention John of St. Amand, Peter of Spain (died 1277; Thesaurus pauperum), Simon de Cordo etc. Among the adventurers from the ranks of the higher clergy were not a few physicians-in-ordinary, e. g. William of Beaufet, Canon of Paris under Philip IV., who in 1304 exchanged his practice for the episcopal chair; Magister Wilhelm (1233), the first physician in Moravia, priest and physicus in Znaim etc. To this office were chosen the more capable, or more frequently the more fortunate physicians, who had already acquired distinction. As an example of an adventurer we may mention Peter of Aichspalt, bishop of Basel, who was deputed to solicit in Rome an archbishopric for another person, but cured pope Clement V. of an accidental sickness and received for himself in return the Electorate of Mayence — the most brilliant honorarium ever given to a physician. Clerical physicians at that period often enjoyed church benefices, in return for which they were expected to instruct pupils gratuitously and to treat the sick without expense — a thing, however, which seems never to have been done. Hence the emperor Sigismund in 1406 enforced these regulations, and in reference to these benefices says: “The high Magistri in Physica treat no one gratuitously, and hence they are going to hell.” Clerical physicians, moreover, in many cities imparted gratuitous advice on appointed days, chiefly in the vestibules of the churches, whither the sick were brought, or whither, if able, they were compelled to come — a custom, as it seems, recognizing the claims of priestly charity, though in other respects the priests did not perform their duties very zealously, as the decree of the Council of Vienna proves.

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[1] A Silesian document of 1353 distinguishes: "Kunstarczt, wundarczt, vrowen, dy do wassir beseen und aptheker." Sebastian Brant makes a distinction as follows: a physician gives sour and bitter drinks, that the patient may get well; a barber dresses and cuts wounds.

[2] The same was the case with the other arts (including painting) in Italy. While in Germany these were reckoned among the guild-trades, and accordingly among the lower occupations in which indentures were required and employed, in Italy eminent painters were highly esteemed and entirely out of the control of the guilds. Yet Dürer said that at home he was merely tolerated by the higher classes, while in Italy the artists were highly respected and prosperous.

We saw something similar during the papal rule in Rome, where all the cripples and sick, with the beggars etc. collected at the church doors, although no longer to obtain medical advice; and we also observe at the present day something analogous in our advertised hours of consultation for the poor, which, however, seem designed to attract principally the purses of the rich.

The secular physicians, who for a long period were scarce, were for the most part physicians-in-ordinary or communal physicians, more rarely private physicians. As city physicians — this class already existed in North Germany in the 13th century, and from this time began to be more numerous in Germany generally — they served only for a definite period at one place and then exchanged for another; or they were chosen for life for a single place. The origin of a class of free citizens elevated also the medical profession and increased the number of its members. Thus Lübeck in 1316 had a ciruticus (chirurgus) with an annual salary of 16 marks, and in 1477 both a physicus and a surgeon who were members of the council. There were also others who were not members of the council. In Vienna too, at that time a small city, there were as early as 1480 eleven physicians. They enjoyed salaries, which were made up usually partly of money and partly of natural productions — in the early Middle Ages the latter alone were commonly employed, and this custom is still preserved with regard to certain classes of officers — in return for which they were required to treat the poor gratis, others at a fixed rate. In Munich, each of the two city physicians in 1325 received a salary of four pounds, about $145, a sum to be estimated at from ten to fifty times its present value.[1] Physicians-in-ordinary to the lower courts were often better situated, on the whole, than are their colleagues of the present day at the greater. A Mecklenburg physician e. g. at the end of the 15th century received, besides quarterly pay for both for himself and two assistants (one of whom performed the duties of an apothecary), an office rent-free, and was required in return to treat gratuitously only the court officials. He was permitted to receive other patients also, and these were expected to pay both the medical fee and for any medicine furnished by the doctor. In surgical cases they were also required to provide a barber to apply the necessary dressings. The Jewish physicians also, who, however, thanks to the hatred of the Christians, decreased in numbers more and more towards the end of the Middle Ages, belonged (e. g. in Frankfort-on-the-Main) to this class, and were in early times appointed physicians to the emperors or, indeed, to the popes. At a later period, however, they were permitted, as a rule, to treat only the members of their own creed, for this was the decision of the Council of Vienna in 1267, and it was even forbidden to the sick to employ Jewish physicians under penalty of the ban. It was the duty of physicians (in Italy down to very recent times), as soon as the patient became severely ill, to summon him to partake of the sacraments, a practice which the Jews did not follow. There were, however, even at that time too, baptized Jews, e. g. a certain Hans von Costnitz (15th century) in Munich. The prohibition of the employment of Jewish physicians does not seem, however, to have been very strictly observed, for it was renewed at the Synod of Bamberg in 1491, and again at Passau in 1497. On the latter occasion, old women etc. were also forbidden to practise medicine. Many "famous" physicians were summoned only for the duration of a particular case, and their pay was colossal, e. g. that of Thaddæus of Florence, who received from pope Honorius IV. 100 gold pieces daily, and, in addition thereto, 10,000 pieces after the completion of the cure. The chief part of the practice of this period was, however, generally of the worst kind. Uroscopy, mysterious feeling of the pulse, mystery in general, alchemy, sympathy cures, superstition and astrology (taught even in the universities) were every day matters. Disgusting and curious remedies and compounds were also customary. Such were snakes, toads etc., dung and per contra precious stones, the Mithridaticum, theriaca, universal remedies, incantations, Arabian syrups, juices, pills etc. Hanging the patient up by the feet, or gouging out one of his eyes, so that the poison might run out, was regarded as a cure for poisoning. Such treatment is even said to have been the reason why the emperor Albrecht was one-eyed.[1] To lie down before the coffin of a saint, still more to creep under it, passed for an excellent remedy. Even so eminent a naturalist as Conrad von Megenberg in the year 1342 went from Vienna to Regensburg, to the grave of St. Erhard, for the sole purpose of "creeping under his grave, while a hymn of his own composition was sung"—and was thus cured too of his hemiplegia. Even the constant current, which to-day plays the same rôle in medical faith as the grave of St. Erhard, could do no more! Medicines were compounded in accordance with idle speculations, or after mathematical formulæ, as we have seen in Alcuindus. The time for taking these mixtures was determined by the position of the sun, moon and stars; indeed the very dalliance of the marriage bed was medically prescribed (as among the ancient Egyptians and Arabians) with a view to secure success. Very commonly, prudential considerations with respect to the purse, i. e. the lesser or greater wealth of the patient, guided the practitioner in his prescriptions. Even open swindling seems to have been permitted, as we have seen in Gaddesden and others. Moreover old wives, like those of the present day, shepherds, jugglers, flayers and especially executioners, with all similar gentry, dabbled in medical practice. Of course there were also honest and judicious physicians (measured by the standard of the age), who may somewhat illumine the picture of the practice of that day. The murderous and frequent epidemics of the Middle Ages, however, permit the really great fidelity to duty of the physicians of the period, both generally and in special cases, to appear in the brightest light. Very many died in the practice of their calling. Thus e. g. at Montpeliier, Venice, Florence etc., at the time of the great plague, almost all, or at least the majority of those who sought to protect themselves by wearing masks filled with odorous materials (and no one will venture to blame them for it) — almost all, I say, died!

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[1] When we compare this salary with e. g. that of the assistant physician of the "Bürgerhospital" at Worms in 1878 ($125 and board, but no private practice), it can be regarded as nothing less than evidence of the high estimation of physicians in mediæval times. In Hesse, until a short time ago, the salary of the physici amounted to about $250.

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[1] Putting out the eyes was disgracefully common in the Middle Ages, especially as a method of punishment. The Byzantine (excellentissimus, God save the mark!) emperor Basil II. on one occasion put out the eyes of 15,000 Bulgarians, leaving one eye to one of every thousand, in order that he might lead his more unfortunate fellow-sufferers back to their czar, who, though certainly not a soft-hearted prince, at sight of such an outrage, swooned away and died in two days.

The mode of visiting and of payment customary among the better physicians of the period, as well as the fees, may be best seen in the decrees of Frederick II. quoted above. In Vienna, in the 15th century, a single visit cost one gold gulden (about $2.50); to-day, on the average, 48 cents, although the value of money at that time was much greater than at present. This appears almost incredible! That, however, individual city-physicians received large sums in gross, and especially honoraria in kind (e. g. a wagon-load of hay and the like), we have already seen. Likewise that the honorarium by previous arrangement might often be fixed very high, especially when famous physicians, in a special case, travelled to a remote place and were compelled to tarry there for some time. Uroscopy, which has been held in great esteem by the common people down to the present time (and is accordingly still practised by "speculative" doctors), cost at Frankfort in 1424, 12 pfennige (at the present valuation of money a little more than 24 cents), an average price which it maintained long after the Middle Ages.

Many physicians proper also devoted their attention both theoretically and practically to surgery, especially in Italy, as we have already mentioned. In Italy, the higher surgeons proper (Magistri in Chirurgia, Chirurgi Physici) stood next to the physicians in education and rank, as is manifest from the curriculum of Salerno. To practice medicine was strictly forbidden them, though this prohibition, as may be easily understood, was often disregarded. They were the special operators in difficult cases, and were not rarely also very capable theorists and authors. Besides the magistri in chirurgia there were also chirurgi phlebotomatores. In France, which, at the earliest, possessed a class or guild of higher surgeons from the middle of the 13th century, these higher surgeons came from the college of St. Côme (founded about 1260 by Pitard). They belonged to the laity, for the Church had forbidden surgery since about the 12th century, and with especial strictness in the 13th, and from this period we may date the origin of lay surgeons in that country. At least after this time they came more and more into the foreground. They seem to have been a class copied from the Italian physicians, and were either permanently settled (at least the more celebrated of them certainly), or travelled about. In Germany this class appeared only very sparingly and late. To it belonged the Würzburg practitioner (1312-1321) Magister Sifridus, cyrurgicus, surnamed "Pfaffenarzt"; the surgeon Meister Heinrich, a citizen of Regensburg; at a later period Pfolspeundt and Brunschwig. Better surgeons appear to have developed here only gradually, after the complete establishment of a class of higher surgeons in France, and probably also in Italy. They came from the class of barbers and bath-keepers, and were not distinguished from the latter by the place and manner of their education (that is they had received no higher education), but rather by the extent of their technical knowledge, acquired by travelling and private study. The "herniotomists" and "lithotomists" were "specialists" among this class. They travelled about freely, and were particularly dangerous people to the testicles, as, even in cases of reducible hernia, they laid hands not only on the radix of the hernia, but on the radix of humanity itself, a method which was almost the rule too until the 18th century. Surgeons-in-ordinary also existed. We have already seen that there were, especially in Italy, single families of surgeons, in which certain operative procedures, like herniotomy, rhinoplasty, and such secret "specialties", were handed down from one member to another.

The treatment of wounds, venesection, in short everything not peculiarly operative, together with minor surgery, fell to the common surgeons (Chirurgi vulgares, Barbiers-chirurgiens, Chirurgiens de la courte robe), who of course, as already noticed, made as many encroachments upon the domain of their superiors as do our barbers of to-day, and were, it seems, also just as ignorant. The first statement at least is supported by the fact of their long continued quarrels with the higher surgeons in Paris, in which quarrels the Faculty of Physicians, while superior to both branches of surgeons, did not always play the most honorable rôle.

In England, where, as already mentioned, there were schools at a very early period, we of course find clerical physicians existing equally early. In like manner there were surgeons, who, however, were called "Bonesetters". Later the profession was so divided, that, besides the medical practitioners, there called "Physicians", there were also "Surgeons" (Chirurgeons) and barbers or plaster-spreaders, the former educated in institutions, the latter by masters. Since 1461 the "Surgeons" have possessed corporate rights procured for them by the military-surgeon Thomas Morestide, and the physicians Jacques Fries and William Hobbes, and have been subject to the city magistrates. At the instance of the latter, in the year 1308, a member of the guild of barber surgeons was appointed to the superintendence of the barbers, and likewise in the year 1334 a commission of three members was named, of whom one was president, to deliver a decision with respect to the treatment of a serious wound, which one John le Spicer of Cornhill had undertaken. In like manner in 1369 three sworn master-barbers were appointed as overseers of the barbers. Finally in 1376 a board of examiners for students of minor surgery, and consisting of two master-barbers, was appointed, in order by the skilled examination of these persons to protect patients from wrong treatment, particularly such as came from the country, and to thus keep away from them the old wives who hitherto had practised minor surgery undisturbed.[1]

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[1] According to Toner, the title of "surgeon" or "chirurgeon" was first recognized by law in England in 1299, though that of "barber-surgeon" was much older. The "chirurgeon" was educated in some institution of learning, and was therefore permitted to wear the long robe and a peculiar style of hat, both of which were denied to the simple "barber-surgeon", who had received such education as he could boast from the hands of a "Master". Both barbers and surgeons employed a striped pole (blue and white) as the sign of their calling, but while the barbers

Even veterinary surgeons existed there very early. "When a horse or other animal is shot, take a seed of dock and some Scotch wax; let a priest read over them 12 masses, add holy water thereto, and put this upon the horse." It seems, therefore, that these veterinary surgeons were likewise clerics, or at least stood in good business relations with the latter. At all events they were certainly good Church-people.[1]

In Germany the lower class of surgeons was represented by the bath-keepers and barbers, who first made their appearance in the 12th century and subsequently formed themselves into guilds. Until the 13th century they seem to have been not only the sole surgeons in Germany, but in

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were limited to the simple pole, the surgeons were permitted to have in addition a gallipot and a red flag to distinguish their vocation. The first meeting of barber-surgeons in England took place quite early in the 14th century, and consisted of Roger Strippe, W. Hobbs, T. Goddard and Richard Kent. The records of the company from 1309 to 1377 and its by-laws in 1387 are still preserved in the Guildhall, together with an act of Parliament of 1420 relating to the company. The charter of the company, as stated in the text, dates from 1461. This charter, however, did not prohibit other persons (not belonging to the company) from practising surgery in London. Hence in 1512 a new charter was procured from Henry VIII., which forbade the practice of surgery by others than members of the company of barber-surgeons within the city of London and seven miles of the same. Holbein (1494–1543) painted a picture of Henry VIII. delivering this charter to the company, and this painting is still preserved in their hall in Monkwell St. The names of the surgeons present at this ceremony are painted upon their persons, and are as follows: Thomas Vicary (master), John Chambre, William Butts and J. Alsop (past-masters), J. Aylef, N. Symson, E. Harman, J. Monforde, J. Pen, N. Alcocke, B. Fereis, W. Tylby and X. Samon. Vicary is said to have been the author of the first work on anatomy written in the English language. In 1515 the barber-surgeons of London numbered 19, and were exempted by act of Parliament from "serving in ward or parish offices, but likewise from all military service." By 1540 a disposition to separate the duties of barbers and surgeons began to appear, and in that year an act was passed providing "that no person using any shaving or barbery in London shall occupy any surgery, letting of blood or other matter, except only drawing of teeth." Surgeons were also prohibited in this act from practising shaving. Four years later the separation of the two classes was still further effected by an act which seems to have allowed the surgeons a distinct organization of their own, though apparently still connected in some way with that of the barbers. The company of surgeons built themselves a new hall in the Old Bailey, where they had a large theater and a dissecting room for instruction in anatomy. No further legal differentiation of surgeons and barbers occurred until 1745, when "An act for making the surgeons and barbers of London two distinct and separate corporations" put an end entirely to their mediæval relations. A new charter was also granted to the College of Surgeons in 1800. (For most of the facts contained in this note I am indebted to Toner's "Contribution to the Annals of Medical Progress and Medical Education in the United States". (H.)

[1] In 1510 (Dec. 4.) Thomas Fabyan was appointed veterinary surgeon to the king's (Henry VIII.) horses, during good conduct, with a salary of twelve pence a day. (H.)

general the only medical faculty. On the other hand, about the same time there were numerous physicians in Italy: during the 12th century 31 are named in Bologna alone, and in the 13th, no less than 47 (Daremberg). These bath-keepers and barbers enjoyed a civil position like that of the flayers, fifers, butchers and such people, that is they practised a disreputable calling and passed before the law and in civil society as "disreputable". Probably it was one of these fellows who hewed off without ceremony the foot of duke Leopold of Austria in 1194, when at a tournament he had received a complicated fracture of the leg by a fall from his horse; though according to another lection he was forced to hack off the limb himself, because there was not a single such surgeon present. Even they, about the century mentioned were still so scarce that Walter von der Vogelweide, when he desired to have his split lip operated on, could find in Worms on the Rhine no competent "Meister". Accordingly he was so treated, or rather maltreated, by such a surgeon in Thuringia, that he was worse after than before the operation, and looked more disfigured. The emperor Wenceslaus in 1406 (out of regard for a bath-keeper's daughter,[1] of whom he was enamored) first declared the bath-keepers reputable, but without effect, as he himself about that time was declared deposed for six years.

The bath-keepers[2] were either owners of their own bath-houses, or they were appointed to licensed houses, or to such as belonged to the municipality, in which case they were required to pay a tax or lease. Their number and their privileges in their respective residences were always determined by the magistrates, or by the guild.[3] One of their chief branches of business was cupping and bleeding the bathers. Guild-ordinances for their regulation first appear quite late in the 14th century — in Würzburg not until 1515. On Sunday barbers'-basins were beaten through the streets by the apprentices to give notice to the people of the beginning of the great bath. They hung out for signs at their places of business a white cloth, and at a later period 1–3 barbers'-basins. Their coat-of-arms — a knotted bandage on a golden field, with a green parrot (an appropriate heraldic emblem of their loquacity) — bestowed upon them by Wenceslaus, like his simultaneous declaration of their respectability, was held in little respect. The golden age of the bath-keepers fell between the 12th and 15th centuries. From the 16th they gradually disappeared, together with the bathing-houses, which at this period, in consequence of the disappearance of the leprosy, of the immorality prevailing in them, and the infectious diseases to which they gave rise, also began to decline. The bath-keepers too were a despised and "disreputable" people during the Middle Ages, and at an early day were united with the barbers. Besides cupping and bleeding, they had the right to treat wounds which had broken out afresh, to shave and to cut hair, all of which duties were to be performed within their residences, while outside they might also treat fractures and dislocations. The executioners also, to whom from their occupation extraordinary knowledge was ascribed until late into modern times — one of them was Prussian court-physician as late as the 18th century! — belonged among the most popular and most valued members of the medical fraternity. The bath-keepers often fell into disputes about their privileges with the guild of the barbers, who enjoyed the same rights, and could in addition take care of fresh wounds and hang out as many basins as they pleased. Strict regulations, however, existed relative to what the barbers could, and what they could not do, without the presence of a physician. Thus they could e. g. treat ordinary bites, but not the bites of poisonous animals or mad dogs, at least without the advice of a physician. After the conclusion of their travels, which were often remarkably extensive, and after passing their examination in knife-sharpening, plaster spreading etc., most of them settled down as regular business-members of their guild, and they were not infrequently appointed inspectors of the leprous; or in times of the plague[1] they were, as "Pestparpierer", charged with the duty of opening and treating the plague-boils. At a later period they officiated as physicians to the syphilitic. They were also frequently "Leibparpierer" (body-barbers) to the greater and lesser lords, with whom, by their cunning, their pandering, their knowledge of the world and of human nature (acquired by their travels) and other good service they often made their fortunes. Such was, for example, the notorious Oliver le Daim, barber and accomplice of that disgrace of France, king Louis XIV., after whose death he met with the rope which he so richly deserved. The ordinary physician of Louis was Jacques Coytier, died 1506. Another of these notorious barbers was the uncle of Dueveke Slaghoek, mistress of Christian II. of Denmark, at whose court this worthy associate of Oliver displayed his talents. Some of these fellows had large incomes. Thus in England the body-barber received from each new-fledged lord the sum of $10; from a count, $25, and from a duke $50. Yet the somewhat unjustly despised barbers were the fathers of surgery and the higher surgical profession, which did not, however, begin to develop among us until the 17th century. Many barbers were salaried by the cities, and some of them were famous writers, as e. g. the learned Hans Foltz of Worms, barber in Nuremberg and a meistersinger (last quarter of the 15th century), who wrote the earliest German treatise on balneology, and as a printer contributed to the extension of the new art. In the imperial cities, however, after 1424 "Meister-Aerzte" were provided, who attended to the treatment of the poor (though the Physici were similar in their functions) and were sworn to perform their duties honestly, receiving a salary, which ordinarily amounted to 100 gulden. The latter sum was fixed by the council of Basel, and from the increased value of money in that day was higher than the salary of our present district-physicians.

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[1] Such girls were at that period frequently employed as bath-attendants etc., for the bathing-houses were generally used as places of rendezvous, and also served as places for public gossip and the retailing of city news, in the absence of hotels. In consequence of the use of woolen, fur and leather clothing, all of which was rarely renewed, bathing was much more common in the Middle Ages than at the present day. A bath of special festivity was that to be taken by bride and groom before the bridal night, on which occasion male and female friends supplied the necessary services. This was a sort of fashion of the sexual toilette. The city of Ulm is said in 1489 to have had no less than 168 bath-houses. Free baths were furnished to the poor.

[2] "Badeknechte", male attendants of the bath, from whom the bath-keepers usually came, existed at Aix-la-Chapelle as early as the days of Charlemagne. They were bondmen, and attended upon the bathers, like the Bademagde or female attendants, who rubbed down the bathers, particularly the men. Among the latter, Agnes Bernauer, who was drowned in 1435 in consequence of her relations with duke Albrecht's son, is the most famous.

[3] In oriental bath-houses massage of the limbs was customary even at this time: "On the Wednesday after St. Thomas's day, 1450, we went before breakfast to a bath in Jerusalem and drank some good new wine. . . . . In the bath they cudgeled and throttled us. They break one's arms across his back and behind his head, and lay him upon his belly and jump upon his back. It is almost murder."

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[1] The burial-grounds for those dead of the plague were often located in the midst of the city, as e. g. at Worms!

Besides the higher and lower surgeons, bath-keepers and barbers, settled in permanent residences, there were others who, according to the custom of the age, travelled about; for at that time many persons (e. g. priests, harlots, artisans, artists, etc.) who at the present day are stationary, travelled about the country extensively. Such "fahrende Wundaerzte" who (as in later times too) called themselves physicians, mostly without any regard to the guilds or the faculties, were often accompanied by buffoons and numerous assistants, had booths at fairs with monkeys and the like, permitted their ineffable fame to be trumpeted about, and wore striking and grotesque apparel in order to attract the sick public, whom they provided with miraculous remedies against all possible and impossible infirmities. One of their chief branches of business was tooth-pulling or tooth-breaking, which physicians and regularly educated surgeons in the Middle Ages avoided on theoretical grounds, or held beneath their dignity. These itinerant surgeons in open market also operated upon cataract (oculists), and performed other similar responsible operations. In 1351 even a famous "female oculist" died, and again in Frankfort we read of one in 1428 named Zerline.[1] These oculists operated more quickly than "one can describe the operations; many patients, however, became blind". Benedetti, who makes the preceding statement, greatly laments that this branch of surgery was practised by farriers, peasants and hired laborers instead of physicians. Their knowledge, especially in anatomy, we may imagine. Yet such fellows treated in this way not only the common people, but also those in high position, until late in the 18th century (in Turkey even at the present day), since nothing better was to be had. It may be remarked, by the way, that certain diseases of the eye were treated in a dark chamber in

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[1] Zerline was a Jewess, who believed that her reputation would warrant her residing outside of the Judengasse and claiming exemption from taxes. The municipal council, however, rejected her application, and in 1489 it ordered that Jewish female physicians should either leave the city or pay taxes like other Jews. In 1494, however, a Jewish "doctress" was exempted from the "sleeping tax", a tax imposed on foreign Jews for every day that they remained in Frankfort. (H.)

Iceland, even at this early period. At last a stop was compelled to be put to their mischief by law. Indeed such protective regulations existed in many places, e. g. in the charter of the university of Tübingen from the year 1477, though without effecting much improvement. That medical affairs in Germany during the whole of the Middle Ages must have occupied a very low grade, is evident from the existence of such preventive regulations, particularly as the good of mankind in other respects during this period was not looked after any too anxiously. Thus an itinerant surgeon once, in order to relieve a corpulent nobleman — Dedo II. (died 1190), called the Good, count of Rochlitz and Croitz—of his paunch (Bantingism), ripped up his belly so that he died on the spot. The count obtained more than he wanted ; for he has become immortal even to the present day as a genuine example of knightly stupidity; while the physician, like a true artist, simply did "enough" for this "noble" of his time, and then vanished from the remembrance of mankind. Such cures in those energetic and sensitive times forced artists of this sort to fly at once from the vengeance of the relatives.

Monks and nuns officiated as nurses in the hospitals, and in special cases bath-keepers and barbers also, though the latter was rare. In private houses both kinds of nurses were common.

When we see surgery (the practice of which was fruitlessly forbidden to the barbers in France by act of parliament as early as 1425, and in England[1] in 1461) almost entirely in such hands, we cannot wonder that all midwifery also lay in the hands of the midwives ("rohe Weiber").[2] At the same time we can form an idea of the original condition of obstetrical knowledge.

The midwives received instruction in their art, even at this time, from the clergy. Albertus Magnus e. g. had published a course of instruction for them, and indeed Councils devoted their attention to this subject. The council of Cologne e. g. decreed in 1280, that in case of the sudden death of a woman in labor, the midwife must keep her mouth open with gags until the child was delivered by Cæsarean section, so that the latter should not suffocate. Even the oversight of the midwives was in some places the business of the clergy. Singularly enough Jews employed Christian midwives, though this was forbidden by the Talmud. Such cases are mentioned in Frankfort-on-the Main, and in Speier in 1084 permission was given to the Jews to employ Christian nurses (wet-nurses ?). The itinerant surgeons usually performed the special operations (or massacres) of midwifery, if the midwives by their own exertions could not accomplish them. In either event it was merely a question of a more speedy end to the mother and child. On the other hand they were very careful about the life of children, as in the following case, which also furnishes us the first German Cæsarean section upon a living mother. A pregnant woman had stolen some consecrated bread in order to sell it to the Jews. She was condemned to be burned, but before executing the sentence the child was removed by an incision. This occurred at Medingen in Suabia in the year 1350, all for the sake of a few wafers (Lammert). That there were also in the Middle Ages female physicians proper, is proved by the females of Salerno. In Mayence too a female physician lived as early as 1288, and another in Frankfort-on-the-Main in 1391. The doctresses of Salerno busied themselves very suitably with e. g. the dressing of ulcerated male members, and pressing out abscesses not yet opened in these localities. There were even Jewish doctresses, for in 1419 one of them received a patent from the bishop of Würzburg.

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[1] It was not until 1540 that an act was passed providing "that no person using any shaving or barbery in London shall occupy any surgery, letting of blood or other matter, except only drawing of teeth". The same act also prohibited surgeons from practising shaving. The separation of the two crafts was further effected by Parliament in 1544, but, as already mentioned, the complete separation of the barbers and surgeons of London into two entirely distinct corporations did not take place until 1745. (H.)

[2] There were five of these in Wurzburg during the 14th century. They were compelled to attend poor and rich by day or night, and could not depart before the termination of the labor. If they wished to go into the country, they were obliged to give notice thereof to the burgomaster. In case one alone at any time could not terminate the labor, she might call in others, on which occasion, however, they were not allowed to scold, stop or swear at (!) each other. The assistance of the nurses was recompensed with four schillings (12 cents) for each birth, though they were allowed to take more if it was voluntarily offered them.

Although veterinary medicine during the Middle Ages enjoyed the labors of educated physicians and non-professional men, still veterinary practice remained generally in the hands of veterinary surgeons little, or not at all instructed in their own department, who were called marescalci, marscalci, or manescalci. In other cases it was abandoned (as we have seen with a part of human medicine) to the hands of executioners and flayers, of manifold medical activity. Diseased cattle, like diseased sheep (and even cases of difficult labor in women requiring operation), were treated for the most part by shepherds, while sick horses were cared for by the farriers, to whom the title of marescalcus was earliest applied. In certain cities salaried "Pferdeärzte" made their appearance toward the close of the 14th century. One is mentioned e. g. in Ulm in 1388. In Frankfort-on-the-Main, however, none appears until 1491.

Even in the second half of the Middle Ages there was no specially commissioned class of state-physicians,[1] though some of the duties of our similar officials of to-day fell to the physicians of that period. Thus Hugo of Lucca as early as 1249 received from the burgomaster a commission (after being sworn) to draw up a legal opinion; indeed, Innocent III., as early as 1209, recommended the appointment of such physicians (in canon law). Ordinarily the city-physicians or physicians-in-ordinary, indeed even surgeons, were employed as state-physicians. Physicians appointed in cities were called physici publici and were sworn officials, since as early as the 14th century the physicians in cities were generally required to take an oath to conform to certain instructions, the transgression of which involved a penalty. Thus e. g. in Nuremberg: "It is also recommended that all physicians, of whatever name, who desire to practice medicine, shall swear that they will protect the sick so far as lies in their power, that they will take moderate fees and put up no prescriptions (the dispensing of drugs was prohibited to them here even thus early), but take all their prescriptions from the apothecaries." (Lochner, "Anzeiger für die Kunde der deutschen Vorzeit," 1877). Strassburg had a city-physician as early as 1328. Several legal regulations required an inspection by physicians in cases of bodily wounds and the rape of virgins (in which the jus primæ noctis, then in vogue, was not included). Autopsies, however, were as yet not permitted, but merely external inspection of the dead, or of the wounded living body. Besides the old Bavarian, Burgundian, Frieslandic, Thuringian and Norman codes on this subject, even the canon law itself (a digest of papal law during the period 1250–1582) required such action. These inspections had for their chief object the graduation of the fine according to the gravity of the wound, since the Germans very sensibly regarded the skin as a part of their movable personal property, and permitted injuries thereto to be atoned for in money. Cases of poisoning, as well as adulterations of the means of subsistence, e. g. wine etc., were subject to medical arbitrament, and severe penalties existed for such cases. The sick, too, were investigated, in case they claimed or needed assistance. Since the time of Frederick the inspection of pharmacies has been added as a regular public function of physicians. It was practised in Ulm in 1426, in Frankfort-on-the-Main in 1461, in Berlin in 1499, in the former cities by the city-physician, in the latter by the ordinary physician of the elector Joachim I. Sworn surgeons, employed by cities and courts (e. g. the Châtelet in Paris) as medical experts, existed in the 13th century in France and in the kingdom of Jerusalem. In the latter kingdom physicians and surgeons were likewise employed as public witnesses, each in his own department, in certain cases.

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[1] A paper of the 13th century (Wormser Urkundenbuch, 1886) relates a case in which a woman had declared that her husband was incompetent to perform marital duty, and the case was investigated by seven respectable and trusty matrons. When the latter had brought in a sworn verdict as to her complete virginity, a decree of divorce was granted the wife, and she was permitted to marry another man. (In ancient Rome five midwives were required in such cases.)

To the emperor Sigismund (1410–1437) is usually ascribed the foundation of the Physicate proper.

Military physicians, as is easily understood, belonged for the most part to the class of surgeons. They also (even down into the 18th century) shaved the faces of the soldiers. Their German name "Feldscheerer" springs from the last half of the Middle Ages, particularly from the time of the armies of "Landsknechte" (15th century forward), and they were enlisted for the war only, as standing armies did not exist. The emperor Conrad II. had, as early as 1038, a field-physician Wipo, and higher physicians followed even the Crusaders. They led a life of adventure like all the soldiers of that period. The higher physicians for the most part went only as physicians-in-ordinary to princes and leaders. Many—Italians especially—seem to have been at an early date regular field-physicians with their armies, and these when serving on ships of war are to be regarded as marine physicians The same is true also of the Germans. Subsequently many of these, having acquired sufficient experience, settled down in permanent homes. Such was the case with Hugo of Lucca, 1218–1221, who accompanied an expedition to Palestine. He took no arms, but merely his instruments and medicines, which were furnished by the city of Bologna. Even with the troops of condottieri there was no lack of surgeons, at least there were such with the soldiers of Braccio (1368–1424). (Platen). English armies as early as the 13th century had military physicians with formal gradations of rank, as "Royal physician," (with pay 2 shillings per diem), his servant (1 shilling per diem), "Royal surgeon" and servants, common surgeon etc. In contrast with our officials of to-day the military physicians who bore the titles of "Royal physician" and "Royal surgeons" enjoyed the pay of an admiral, their assistants, that of a ship-captain. At the beginning of the 15th century "surgeons", field-surgeons, accompanied English armies, and (as was the case also in Germany at a later period) were so enlisted that their assistants were included in their own appointments. The surgeon received as pay 40£ per annum, each of his assistants 20£; the former 12 pence per day additional for subsistence, the latter six pence — high pay when we consider that at the close of the 15th century an English laborer received only about $4.25 annually, with $1.00 for clothing.[1] In addition they were entitled to a share of the booty. Of the proceeds of the booty the surgeons were expected to give up one-third to the King, together with all precious stones, gold and silver, in case the sum total of these exceeded 6£: a lesser sum or the residue, however, belonged to themselves. In addition the armies had, even at this period, field-pharmacies. At a little later period Spain had a regular system of military hygiene, including field-hospitals. (Fröhlich). German cities, which, when war broke out, were summoned to furnish troops for the field, about the same time appointed for their contingents Feldscheerer, pharmacies and hospital wagons. Little, however, can be learned of their general arrangement. Since their were no standing armies, there could be no permanent military physicians, but such medical help was taken as could be found in the vicinity (including even experienced women), and it was not badly paid. Thus in 1450 a "Meister" received for the cure of four soldiers the sum of 200 old groschen (about $6.25), a considerable fee for that day (Fröhlich).

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[1] This was the pay of Thos. Morestide and Nicholas Colnet, surgeons to the French expedition of Henry V. in 1417. Morestide seems to have been the surgeon-in-chief of the expedition, though Colnet must also have held high rank. This probably accounts to some extent for their high pay, which must not be taken as the regular pay of an ordinary surgeon in those days. But even the pay of their assistants, 20£ per year, must have been far above the average pay of surgeons; for in 1514 the pay of an ordinary surgeon in the field, according to Richards, was only 8d. per diem, or about 12£ per annum, the same as that of an archer. The ordinary pay of a laborer in 1350 was only a penny a day, and this sum did not reach 2d. until nearly a century later. Yet the pay of an archer at the earlier period was 6d. per diem. Perhaps ordinary surgeons may have felt extraordinary aversion to military service at this period, for we find them impressed into service as late as 1636. (H.)

After the 12th century there also developed gradually in Europe (on the Arabian model[1]) a class of men and institutions, which henceforth have stood in the most intimate relations with practical medicine — I refer to pharmacists and pharmacies, in our modern sense of the terms.

This was the case perhaps earliest in Spain; for pharmacies were very early established by the Arabians[1] in Cordova and Toledo. In Italy, however, such shops must have existed before 1140, since in that year Roger published decrees relative to them, which Frederic II. in 1224 enlarged into a formal ordinance for apothecaries. In this ordinance a distinction is made between confectionarii (druggists) and stationarii (apothecaries) — Apotheke = statio, in France = Boutique, in Germany at that period = Bude, and later Medicin- or Doctorapotheke. In the 13th century there also existed in France an "Instruction" for apothecaries. The latter formed here a guild, the fifth in rank. In the beginning of the 14th century they were raised to the second rank, and their "Masters" accordingly had the right to wear long black gowns with wide sleeves and velvet facings, like the judges. They, with the merchants, preserved the standard weights of Paris. The physicians were their overseers. Many compound remedies were prepared by them in the presence of medical commissioners or magistrates — the latter in German cities also. Among these compounds was theriaca, which was prepared in some cases even in the last century in accordance with this method, so as to escape adulteration.

In Germany the apothecaries were originally rather druggists and confectioners, and procured their wares chiefly from Italy. Wetzlar in 1233 had one of the earliest pharmacies. Another existed in Worms as early as 1248 (Urkundenbuch, 1886), and several pharmacies are mentioned in the year 1267. The apothecary Thomasius had one in 1254 in Würzburg (Lammert); a certain Willekin opened another in Münster in 1267; another has existed in Augsburg since 1285. They were then established also in Strassburg 1297, in Esslingen 1300, in Ulm 1364, Nuremburg 1378,[2] Leipsic 1409, and in Stuttgart 1486. The cost of a pharmacy in that day was about the same as now. In 1412 the establishment of a pharmacy at Schweinfurth cost 5000 French gulden (according to the present value of money $12,500). The business, however, was privileged; at least the Berliner-Deutsch privilege, granted in 1488 to the Bärenapotheke in Berlin.

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[1] Harun al Raschid erected the first institution of this kind in Bagdad. See p. 235

[2] The tariff of a Silesian pharmacy in the 14th century gives the following prices:

Syrup of Roses Simple Syrup	1 pound	1½ Mark.
Aurea Alexandrina Theriaca	1 ounce	2 Marks.
Ol. Rosati	1 pound	2 Marks.
Aromatic Pills	No 15	1 Groschen.
Ol. Benedicti	1 pound	10 Marks.

guaranteed protection against grocers, a gown and a free residence — on the whole a good arrangement. Its late owner, Dr. Carl Edward Simon, is honorably known in a wide medical circle by his "Arzneiverordnungslehre", published in connexion with Posner.

"We and our successors will not permit any grocer, whether resident or itinerants to keep for sale any confection or colored wax, nor anything which serves for, or belongs to, an apothecary-shop. Moreover we and our successors shall and will give to him and to his successors, while they possess such an apothecary-shop, every year a gown and a free residence. . . . ."

The association at that time of the business of the apothecary and the confectioner is proven by the following obligation, imposed upon the apothecary-shop erected at Halle in 1499 by Simon Puster: "Therefore he shall and will give to us and to our successors each year, being ten of us, as a council, two collations on fast days at our council house — eight pounds of well confectioned sugar, honest and suitable for such collations."

In London an apothecary-shop existed as early as the year 1345.[1] In France a law for the inspection of pharmacies was promulgated as early as 1336. What benefits, however, the pharmacies have conferred and must confer upon practice, and consequently upon suffering humanity, may be seen from a consideration of the great evils which prevailed even in the capital of France in 1352, and to which it was sought to put an end by the following prohibition:

"The Dean and Masters of the Faculty of Medicine of the University of Paris have represented to us that persons of both sexes, some women of advanced age, converts, country-people and a few herb-doctors, practise in Paris, though the science

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1. Edward III. in 1345 conferred a pension of 6d. a day upon Coursus de Gangeland, a London apothecary who had attended him during his illness in Scotland. Freind also mentions Pierre de Montpellier and J. Falcand de Luca as apothecaries in England about the middle of the 14th century. A few years later Chaucer says of his "Doctour":

"Ful redy hadde he hise apothecaries
To sende him drogges and his letuaries,
For ech of hem made oother for to wynne."

In 1540 four physicians were appointed to inspect all "wares, drugs and stuffs" sold by the apothecaries of London. In early times the apothecaries and grocers of London were associated in one guild, but they do not seem to have been regularly incorporated until 1606. This corporate union, however, was very short-lived, for in 1617 they were separated by a new act. (Toner.) This separation seems to have occasioned no little dissatisfaction among the grocers, but king James was firm in his determination, and in reply to an address seeking a restoration of the union declared "he intends to maintain the Apothecaries' Company separate from the grocers, who have no skill in their wares". This was as late as 1624. In 1618 a proclamation commanded "all Apothecaries to compound their medicines after the directions of the Pharmacopoeia Londoniensis, lately compiled by the College of Physicians of London", and in 1624 a new act of incorporation of the apothecaries of London was passed "for avoiding of deceipts and abuses in making and compounding of phisicall receipts and medicines, and for the suppressing of empiricks and unskilful practizers and professeurs of the art or mysterie of Apothecaries in and about the city of London" (J. M. Richards). (H.)

of medicine, the bodily constitution of men, the right moment and the right method and way of employing drugs, as well as their properties, are unknown to them, especially cathartics, which may bring life into danger; that these people alter remedies against all reason and all the rules of art, and supply and administer very strong purgative, and badly acting clysters, concerning the use of which they are not sufficiently informed; that this abuse of drugs aggravates diseases, has human death for its result, as well as secret and untimely birth and sometimes even open abortion . . . . so we prohibit any altering medicine, syrup, elixir, or any clyster from being compounded or administered."

The administration of enemata was originally a very profitable and privileged business of the apothecary—it was for a long time quite fashionable among the fine lords and ladies, in whose boudoir a neat syringe was never lacking—and was either practised upon patients by the apothecaries themselves, or by their assistants, until this duty was taken from them by the barbers. Purchases of drugs were often made at the Frankfort fair. How much money was expended for this purpose by an apothecary is shown by the case of Peter Schmitt, apothecary in Kitzingen, who imported for his pharmacy "all roots, flowers, juices, oils, syrups in summa, which belong to the pharmacy, and likewise composita, such as pills, trochisci and other things in general use" (Lammert), for sale in the place mentioned, having secured from the magistrates for this purpose in 1474 a grant of 60 gulden. The latter was a large sum in that century, when an annual income of \$62 to \$125, even in cities like Augsburg, stamped upon the possessor the seal of great prosperity, and an income of \$875 made a man a perfect Crœsus (Scherr).

In Stuttgart an ordinance regulating apothecaries and their prices has existed since 1486. An earlier one, however, appeared in Strassburg in 1400. In the former ordinance it is directed that the drugs must always be well selected and not decayed; that nothing except what is prescribed shall be put into a medicine, especially nothing dangerous by way of substitution; That the apothecary shall be responsible for his "Apothekersknechte" (clerks), and shall not give any pernicious drug or any abortive: that the price-list of the apothecary shall be correct: that in doubtful cases he shall apply to the physician etc. Prices were arranged as follows:

Species 1 Loth[1] = 5 Schillinge, 4 Heller; Confection with musk, amber or precious stones, 1 Loth = 8 Pfennige; Sugar 1 Unce = 6 Pfennige; Theriaca and all ordinary opiates 1 Loth = 8 Pfennige; Mithridaticum 1 Loth = 2 Schillinge; Syrup 1 Loth = 8 Pfennige; 1 clyster = 8 Schillinge; Palma Christi 1 Loth = 1 Schilling, 4 Pfennige; poor diachylum 1 Loth = 8 Pfennige; common salve from common oil 1 Loth = 8 Pfennige.

That there existed in the monasteries a sort of medico-botanic gardens we have already mentioned. A public medical garden was laid out in Venice, however, in 1333.

Lunatic asylums (as we call them to-day) must also be mentioned here, as most beneficent beginnings of a regular treatment of the insane.

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[1] The Loth was a weight of about half an ounce. Species are what we now call pulveres compositi. (H.)

The latter in the Middle Ages were regarded as persons "possessed" by the devil and his male and female assistants, and, when not abandoned to their fate or shut up in prisons (indeed private prisons, where a certain sum paid for their lodging and care), they were maltreated by the clergy with conjurations, exorcisms, etc. Such institutions existed as departments of hospitals, which were so numerous during the Middle Ages, and which, under the charge of the clerical orders, were little but houses of death for the poor, so wretched were their arrangements. But there were also special houses for the insane, the first of which was established at Feltre in Italy. The next was that of Seville, established in 1409; then one in Padua 1410, Saragossa 1425, Toledo 1483 and Fez 1492. In these institutions the raving and turbulent were chained up and occasionally soundly beaten. That such asylums for the care or detention of the insane (though so totally unlike our asylums of the present day) arose at so late a period, though the Middle Ages were very fruitful in charitable institutions for other sick persons, is explicable only on the ground of the aforesaid ecclesiastical superstition, which, indeed, prevailed down into so-called modern times. The fact too that in the Middle Ages (and sometimes also to-day) many forms and expressions of religious insanity were regarded as godly piety, and open religious lunatics passed for saints, will assist in explaining the comparatively late origin of institutions for the insane. We must, however, picture these to ourselves rather as houses of correction or penitentiaries — in Lübeck these houses of detention were called "Tollkisten", and were under charge of the jailer — than as institutions for the care and treatment of the inmates. Debtors' prisons, leased by private individuals or to creditors, were likewise regarded occasionally as institutions for the safe-keeping of the insane. Such was the case in Frankfort-on-the-Main in 1460, where there were nine such prisons, each nine feet long, broad and high, one of which contained a crazy woman, another a priest, a third a crazy apothecary. Of medical treatment there was not the least thought. The insane wallowed about in chains and without clothing in such horrible dens, covered with filth and their own excrement, as long as they were able to endure it without dying. Towards the close of the Middle Ages the treatment of the insane became a little better, especially in the free cities, where compassionate and charitable citizens assumed their care instead of the police goalers. This was done e. g. in Lübeck from the year 1478 (Pauli). Proper houses for the guardianship of the insane were also called into existence gradually by the example, donations etc., of others.[1]

From the last period of the Middle Ages, which, as we have seen, has transmitted to modern times (though mainly in an unfinished state) so many fruitful ideas, beneficent discoveries, fortunate suggestions and new institutions, spring certain regulations which are to-day again the subject of lively discussion. I refer to measures for the isolation of the sick and quarantine establishments against infectious diseases. These owe their existence to the observation that the plague spread by contagion and was carried about by ships. In this latter way the disease came from the Crimea to Venice, and from England to Norway. Accordingly there was established — the first arrangements of this nature reach back to the 10th century — in Venice in 1348 a "Board of Supervision", a sort of council of hygiene, which in the end served as a model for all Italy.[1] At Majorca as early as 1374 a committee of officials, under the presidency of a physician, Lucien Colomines, was appointed with extensive powers, to whom the local magistrates at the outbreak of the plague were directed to report. This committee was also allowed a hospital, and it was directed that no ship should discharge passengers nor unload freight without their knowledge, nor should any port-sales be held without preceding notice to the sanitary council. Suspected ships were required to keep quarantine for 40 days (hence the name quarantine).[2] Another effort to prevent the plague by isolation was made in Milan, and the city remained exempt by this means until 1350. This was again attempted at Reggio in 1374 by an ordinance of the viscount Barnabo, and subsequently in numerous other places. In Paris a similar sanitary commission was appointed in 1350, and a sanitary council in Venice in 1485. Strict regulations regarding the adulteration of food and the sale of bad food also existed. Thus the Berlin butchers were compelled to take an oath about 1400: "I will sell no suckling sow, no consumptive or one-eyed cattle, and no cattle purchased from poor people out of the hospitals or out of the Hospital of the Holy Ghost" etc. The so-called "Libenzüchter" as early as the 14th century exercised supervision in Strassburg over the moral and sanitary relations of the populace.

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[1] In antiquity too the treatment of the insane was no better. Solon e. g. ordained that bad maniacs should be confined, while the good-natured should remain under private care. The same was the arrangement among the Romans.

In Iceland they were entrusted to relatives who had enough servants to take care of them, and where, at all events, they were not abused as in other lands. (Weinhold.)

From the great mortality manifested by epidemics during this portion of the Middle Ages it seems to follow that these regulations occasioned, on the whole, as little benefit as the similar regulations of the present day accomplish against the epidemics of modern times. This failure was much more readily explicable in the Middle Ages, since the cemeteries lay, as we have already remarked, in the midst of the cities. But the sublime police of the universe cares not the snap of its fingers for the petty police of mankind, and upon this fatal rock a great portion of the practical work of the physician in epidemics is brought to wreck, though in single cases here and there a good result is accomplished, or apparently accomplished. The next epidemic, however, reverses the teaching.

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[1] And in fact for Germany also. At least Augsburg and Nuremberg in the 16th century took for their model the arrangements of Venice, a city with which they enjoyed an active commerce.

[2] The term of 40 days was chosen either on medical grounds — the 40th day was looked upon as the most critical in inflammatory diseases — or on religious or astrological grounds, since Moses was 40 days upon Mt. Sinai, Lent lasted 40 days etc.

THIRD PERIOD.

THE MODERN ERA.

MEDICINE FROM THE DISCOVERY OF AMERICA TO THE CLOSE OF THE FIRST FRENCH REVOLUTION.

A. D. 1492–1800.

HISTORY OF MODERN MEDICINE.

THE MODERN ERA.

Each period in the history of the civilization of a particular people, as of mankind in general, is obviously the sum of a great number of antecedent factors, mental, moral and physical. Each age too is the result of the past, as well as an active and determining part of the future.

Thus the so-called Modern Era appears as the uninterrupted, but more vigorous, continuation of the course of mediæval civilization, which had been so unmistakably progressive in its character. More especially it seems an expansion of the individual culture of the past into a future cultivation of the masses — of the people now purified by the physical agitation of the Middle Ages.

Accordingly the limitation of historical periods by certain definite years is more or less arbitrary, and at bottom merely an expression of the impossibility of dealing in a literary way with history without the aid of such artificial and rude landmarks. For history in fact displays an unbroken, but constantly ebbing and flowing development, and these artificial divisions are mainly the work of scholastic convenience.

Thus the so-called Modern Era may be merely externally separated from the Middle Ages by some event of special prominence, e. g. the Discovery of America. Yet this customary limit is by no means a matter of historical necessity. It does not separate in the history of civilization a period wanting in development from another period new and progressive in its character. For while, on the one hand, the latter half of the Middle Ages displayed, as we have seen, a lively progress in culture, on the other, the mediæval period continually projects a thousand dark shadows into our so-called Modern Era — shadows which, as may be easily shown, yet hover daily and hourly above us and cross our path with gloom. Great gaps, it is true, are broken in the frail boundaries of both periods, but the walls are not yet entirely thrown down, nor, to all appearances, will they be completely destroyed for a long time.

Yet the discovery of America forms a landmark better adapted certainly to the history of medical culture than to that of other branches of civilization (with the movements and tendencies of which it ever keeps pace), since from that epoch new and vigorous representatives enter the field and begin the struggle for that supremacy which they to-day possess —we mean the Germanic races.

If we have heretofore claimed for the Middle Ages (in many respects so unjustly despised) such importance in the advancement of civilization, this claim, if based upon correct ideas, must be established particularly by the phenomena of their close. And such is the fact! We need mention again merely the introduction of the compass, which alone rendered possible the discovery of a new world; the invention of firearms, which rendered harmless feudalism and its outgrowths, the "Raubritter" and their castles; above all the immeasurably important invention of printing,[1] from which epoch forward the masses, and no longer the learned alone, took part in the intellectual life of mankind. We may notice further the invention of clocks (steeple-clocks in the 14th century) and the rapid development of the arts, especially architecture and sculpture, then painting and music. In the sphere of religion we may recall the resistance of the Waldenses (originating in 1170) and of John Wickliffe (1324–1384); the death of the hero Huss (born 1373, burned at Constance in 1415, declared the doctrine of papal infallibility to be the creation of a fourth member of the Godhead) and the fiery Girolamo Savonarola (born 1452, first strangled and then burned in 1498), from whose funeral pyres avenging sparks penetrated into the rotten Papal System. To these we may add the revival of the study of the Ancients — Humanism[2] — and the struggle under the standard of Italian Platonism against the fetters of that scholasticism which dominated from the 9th to the 15th century.

On the other hand, modern times have undoubtedly preserved, even to the present day, very much — more almost than we are willing to admit — of mediævalism. — At the outset of this period a perfectly enormous mass of superstition and delusion prevailed among even the greatest minds. Luther himself — the hero of the greatest political and religious achievement[3] of all modern centuries — believed absolutely in an incarnate Devil, who not only tormented him out of Wartburg (1521), but also plagued him after his marriage. Melancthon (1497–1560) too was devoted body and soul to astrology. Many physicians likewise, and the most eminent of them too, like Paré, Fernel, Peucer, De Haën etc., were, and continued to be down into the 18th century, convinced of the influence of demons and the devil!

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1. How small was the number of medical works appearing annually in that day may be judged from the fact that a catalogue of 1564 mentions only 24 on medical subjects.
2. By the term "Humanismus" the Germans designate a system of education based upon the study of the classics. The revival of classical learning in England began with the lectures of William Grocyn (1442–1519, a pupil of Chalcondyles) at Oxford in 1491, and was ably promoted by Linacer (1460–1524), John Colet (1466–1519), dean of St. Paul's and founder of St. Paul's School in 1510; William Lilye (1466–1523), the first master of St. Paul's School, and the first teacher of Greek in London; Richard Fox (died 1528), bishop of Winchester, founder of Corpus Christi College in 1516, the first college in Oxford to make provision for the study of Latin and Greek; John Fisher (1459–1535), bishop of Rochester; Sir Thomas More (1478–1535); Cuthbert Tunstall (1475–1559), bishop of Durham; Hugh Latimer (1490–1555); Roger Ascham (1515–1568), the teacher of queen Elizabeth, who was herself quite a fluent reader of the classics; and others. (H.)
3. An achievement, however, for which he had been fitted by the men of the preceding century. In the ætiology of diseases Luther regarded the influence of Satan as paramount. His son Paul (1533–1593) was physician and alchemist to Joachim II. of Brandenburg and to the Elector Augustus of Saxony. He was the first clergyman's son to become a physician, though subsequently he found many imitators.

And the poor people, to whom the grossest superstition was served up annually in their almanacs![1] And the belief in witches, which the Church utilized for its own ends, and to which secular justice also lent its aid by employing the rack to procure evidence and then executing the poor victims, while the Church with hypocritical innocence could often lament the rigor of its ally! Yet that superstition ought not to seem to us so very monstrous! Indeed, we have to-day many a one which surpasses very considerably the belief and superstition of the Middle Ages! Did the Middle Ages venture to proclaim as a dogma to the astonished world, first an immaculate conception,[2] and next the infallibility of a man? — Moreover we still retain a good part of mediæval political life. Does representative government, to say nothing of popular self-government, everywhere exist? Have we not still the greater part of mediæval class-distinctions, instead of the equality of all persons intellectually qualified therefor? So long as we have an hereditary nobility,[3] disposed at all times to unite with the parsons under the priests, when such a course furthers, or seems to further, their own advantage in opposition to that of the masses: so long too as the priests exercise on weak minds their mediæval influence, rooted, as it is, in superstition, so long we still retain a good share of the worst inheritance which the Middle Ages have left us. In the Middle Ages too originated the war between classes, which began in the foundation of the citizen class and crowned itself with noble results in the bloodiest revolutions; hence the dismal, but historical struggle of the fourth estate, which began with the poor people of the Middle Ages, relieved itself first in blood during the peasant wars, and is continued to-day in our modern socialism. Externally, indeed, a so-called new era has been marked out, but internally no new era has been in truth as yet attained. The shadows of the Middle Ages have not to the present hour yet reached their end in too many ways and in unnumbered minds. A new era may justly be assumed to exist only when the tasks which the so-called Middle Ages in their closing centuries delivered to us are completed, and when their problems are solved.

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1. What frightful things these (Aderlass-) calendars contained the following prophecy for the years 1528–'29 will testify: "In this year the aspect of the three superior planets will be frightful. This will be followed by terrible casualties to human life and by many sorts of disease, madness, apoplexy, sore throat, abscess of the breast, coughs, consumption, the bloody flux, premature births, sterility, uterine disease, gout in the feet, fever on every second or third day . . . frenzy, dropsy, jaundice, colic, the French disease." Erhard Etzlaub,
Amateur in the Free Art and in Medicine.
The least to be anticipated from all this was the end of the world, a catastrophe which was expected with perfect certainty during the 16th century by everyone, with Luther as we know, at the head!

2. That conception was possible without male co-operation — the popes during the Middle Ages declared the latter to be a defilement, though without in any way shunning such defilement themselves — was a common idea. This preposterous, but very ancient opinion the Egyptians long before had called to their aid in the well-known case of the daughter of one of their kings, who, without waiting for a religious or civil ceremony, had fallen into an "immaculate" condition!

3. Among the ridiculous qualifications in accordance with which mankind classifies its members, nobility of birth is one of the most pregnant in an historical view!

From the schools — and so thought the reformers of education in that day —from the schools only could the genuine new era arise!

Doubtless a mighty impulse was at once given in the discovery of America (Oct. 12, 1492) by the noble Columbus[1] (1436–1506), an impulse second to that of printing only; for by it, at one stroke, half of the actual world and an entire new world of mind were revealed, and unexpected food supplied to the observation and thought of mankind. This discovery had in a material point of view a similar effect to Christianity in a religious: as with the latter began the universal phase of religion, so in the discovery of America began the universal phase of material progress. The two phenomena resemble each other also in the the fact that they both worked for the benefit of the "lower" classes. By the discovery of America the circle of vision of the masses was infinitely enlarged, and above all an indescribable influence was exercised upon their minds. They were aroused and healthfully shaken out of their plodding existence, in material and intellectual oppression, by the knowledge of the astonishing discovery of a New World, with other inhabitants, with treasures and magic productions exaggerated in fable, indeed, with genuine antipodes,[2] whose existence, among the popular subjects of dispute in the Middle Ages, had most persistently struck the fancy (Freytag).

To this was added the doctrine of Nicholas Copernicus[3] (1543) that the earth, now explored for the first time with regard to its size and form, was no longer the fixed center of the universe, about which the latter revolved, but that (in opposition to the teachings of the Church) it revolved about the sun, itself a small planet, like the other planets of the vault of heaven. A mighty breach was thus made in the doctrine of the Church, and a broad pathway was broken towards the light, in spite of the fact that the Church at once rejected this truth as a heresy and prohibited its teaching.[4]

Equally powerful as a leaven of life for the masses was the doctrine of Luther; for by it they were touched in their inmost feelings and awakened from their circumscribed views. The people saw in this doctrine their liberation from an unprecedented yoke and from priestly oppression,[1] beneath which they had groaned in religious and political slavery for centuries. Hence it acquired from the outset, besides its religious effect, a decided political and social, in fact a revolutionary, influence.

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[1] Even before Columbus, the Northmen, about A. D. 1000, and 500 years earlier the Buddhist priest Hwui Shan, had, as we know, visited America. The latter came from Asia to Alaska, and then went as far south as Mexico.

[2] During the years 1519 to 1522 Fernando de Magelhaens, by his circumnavigation of the earth, had furnished the proof of its spherical form.

[3] Copernicus (Coppernics, Kopernigk, 1473–1543), the son of a merchant of Thorn, studied medicine first (1491–'94) in Cracow and then in Bologna. Graduating at Padua in 1503, he was appointed canon in his native city, and devoted his attention also to astronomy. His work "De Orbium Celestium Revolutionibus" was, as we know, never shown to him in print until he lay upon his death-bed. He always practised medicine, and has left a collection of his recipes which are in no respect superior to those of his day.

[4] As a matter of fact this prohibition was not removed until 1811.

By the restoration of marriage the priests, as sons of the people, stepped back again into their midst, upon the ground which was to be the field of their spiritual labor.

"Above all the removal of celibacy was a social advance. . . . . It is true the marriage of the clergy had not been discontinued (de facto) during the whole Middle Ages . . . . . In Germany the housekeepers of the clergy (who were to be of "canonical" age — as they are to-day — that is to say at least 40 years old, so that menstruation and child-bearing might have ceased — the latter too a moral institution!) were a numerous and not unassuming class. But the country clergy were compelled to purchase toleration of this relation from their bishop and from the Curia . . . . . and however complaisant the higher clergy might be . . . . the masses looked with hate and scorn upon these irregular marriages. And, most important of all, the children of such unions remained under the curse of their birth as long as they lived. Scarcely a single civil occupation was open to them, and even the guilds of the artisans declined to receive them. They were lost among the laborers and vagrants. And yet the permanent sexual relations of the Catholic clergy . . . . were indeed a piece of good fortune to the congregations. . . . . . From a hundred pamphlets it may be seen how heinously the fickle sensuality of the priests in hamlet and city corrupted the domestic life of the members of their congregation. Among the Protestants, on the other hand, the profession of the clergy was a convenient bridge, over which the blood of the peasant ascended to a higher activity!" (Freytag.)

Equally influential with the fact just mentioned, if not even more active, was the circumstance that the national languages[2] now finally came into common use, and even took precedence in writings, sermons, popular poetry (once more revived) etc. In this way the masses for the first time took part in the intellectual life of the age, a part which the dead language of the Church (in itself an indication of foreign domination) had heretofore wrested from them. This was particularly conspicuous in Germany, and by means of this lever e. g. Luther (1483–1546) and Hutten (1488–1523), through inflammatory, and as yet almost uncensured, pamphlets, laid the foundation of our modern press, and exercised a prodigious influence, utterly inconceivable to us. For their words, scattered everywhere by the art of printing and the indefatigable printers and publishers of this century, were now intelligible to all. Upon this powerful agent the Reformers (including Paracelsus also) based their calculations and built up their superstructure. Hutten declared that he wrote German at this time in order to be intelligible to his native land, which he was not before when he wrote in Latin. And these fearless and free words by no means spared the high, mighty and powerful, whether noble, or king, or priest, or bishop, or pope —all were scourged with a recklessness of language heretofore entirely unheard of. The 16th century was the epoch which gave birth to that part of modern society which we call the "people", and, on the other hand, the priests and feudal lords of earlier times step henceforth into the background. It inaugurated the modern democracy. A democratic tendency spread at this time throughout all lands, a tendency which the absolutism of the following century could only now 'and then suppress, only however to burst forth again more powerfully at the close of the 18th century.

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[1] "A presentiment of their own power and ability for the first time penetrated the souls of the common people. . . . . Christ had by his death redeemed even the peasants." But they had been the victims of the youthful noblemen and of the Church. "Dishonest, cunning and luxurious, like the Italians, was the dean who rode through the village with his falcon, his wenches and his troopers; their priest, whom they had the right neither to choose nor to dismiss, who seduced their wives, or lived in scandalous domestic life with his mistress and children; the mendicant friar, who insinuated himself into their kitchens and demanded for his cloister the meat in the chimney, the eggs in the basket. A smothered agitation spread throughout the congregations of South Germany." Expulsion of the mistresses of the clergy (whom Luther called "Plattenhengste" i. e. stallions with a tonsure) became the order of the day: "for the common people, moved and vexed by their injuries suffered in property, body and soul, and oppressed treacherously and immeasurably by the priests, would suffer no longer, and had every cause to strike right and left with club and flail." (Gustav Freytag "Aus dem Jahrhundert der Reformation.")

[2] How far at this time a similar current of culture reached, and how widely the development of human civilization at this epoch had a reformative tendency, may be inferred from the fact that the oldest Asiatic peoples, like the Chinese and Indians, embraced the same idea. With both of these nations the national tongue took in religious writings the place of the sacred language, and the reformers who then appeared — Kabir (1450), his teachers Râmânand and

But the most powerful agents in the introduction of a better era were the new philosophical and skeptical currents of thought which began to make their appearance, and subjected all mediævalism to the tests of proof and doubt. To these must be added the powerful upgrowth of popular i. e. universal schooling and mental culture, which began towards the close of the Middle Ages and in the commencement of the Modern Era. This fell henceforward more and more into the hands of the state and the communities, like the care of the poor and the sick: for the means squandered by the Church during the Middle Ages now remained in their hands, and furnished them with the facilities for such work. The Church had always recognized the fact that the possession of the money and the schools was its greatest lever, and now the communities too had caught the idea and utilized it for their own benefit. To perfect this scholastic and mental

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Nanak — extended their influence by means of the popular language down into the strata of the uneducated masses. (Prof. Trumpp, "Die Religion der Sikhs".) The Indian emperor Akbar the Great (1542–1605) even compared the religion of the Jesuits (from whom he received instruction) with the Indian creed, but finally remained true to his original faith, because he could not conceive that God could have upon earth a standing representative (pope). (Duke of Schleswig-Holstein, pseudonym Count Nuhn).

education is, therefore, even to-day our most pressing duty. Among the numerous external influences which effected an improvement in the condition of mankind we may only mention further, as the most powerful and most prominent, commerce, to which the new ocean-routes and new productions afforded a support heretofore wanting. Through it men of different languages and customs first came into more frequent and intimate contact with each other, and thus the Cosmopolitanism of modern times (like the the earlier Humanism resulting from the study of the Ancients, particularly the Greek authors now introduced into the schools) was awakened and vivified—in the main a blessing, though in many respects also productive of evil. The greatest promotion of ocean navigation (which as early as the 15th century had received its fundamental principles from German mathematicians, by whose means the Portuguese and Spaniards accomplished their voyages of discovery) in the 16th century again proceeded from a German, Gerhard Kremer (Mercator, 1512–1594), the discoverer of the magnetic pole. He also furnished the first useful ocean charts and geographical maps in general, and called the complete collection of them an "atlas". In both centuries too the Germans furnished the scientific principles upon which other nations based their voyages, their commerce and their wealth, while they themselves were not able to appropriate the ocean trade, although at an earlier period they had carried on the most extensive commerce (Hanseatic League). In the new era they lost their position as the first commercial power to England[1] and the Netherlands.

That the influences already mentioned had a powerful direct, and especially an indirect, effect upon medicine, is easily understood and as easily proven.

Besides these, other special influences, partly continued from the past, partly of new origin, made themselves felt in either advancing or hindering medicine as a special branch of general culture.

First of all the Humanistic physicians, or rather the medical philologists, quietly but actively undermined the preceding Galenico-Arabian structure. They erected the arsenal from which the warriors on the battlefield of medicine took their armor. Yet they undermined not only the Galenico-Arabian medical system, but with it, though partly involuntarily, the ancient medicine in general.

Medicine in the beginning of the Modern Era received its mightiest impulse by far from the same strongly Protestant and progressive spirit, which in the department of religion broke the authority of the ancient Church; save that in medicine this spirit led the struggle against the medical pope of the Middle Ages, Galen, and against his servile and subtle

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1. It may be remarked here that even at this time a tariff war prevailed between England and Germany. The struggle between the "Monopolists", as the English company of "Merchant Adventures" was called, and the comparative "Free-traders", who belonged to the Hanseatic league, was also lighted up. (Möser, "Patriotische Phantasien.").

expounders, the Arabians, and finally against the superstition of the priests and monks. Thus was called into existence what we must call a national medicine, which, through the living spirit of the nations and through their language, won fresh momentum and better comprehension by all, than the musty dead-letter of mediæval medicine. In this way only can we comprehend e. g. the immense influence of a Paracelsus!

In medicine the German element now supplied the productive part of the ideas and the lasting intellectual deeds. A characteristic peculiarity both of the new culture in general, and of medical culture in particular, was their extension to an ever increasing number of people, while in preceding ages, especially during Antiquity, a single nation was almost always their sole support. Thus began what may be designated as the Universal Medicine, in the acquisitions and services of which all civilized people will one day take an equal part, and for the completion of which a broad foundation was then laid.

New forms of disease, which the last years of the Middle Ages had generated, and whose number the modern period still increased, brought a more reliable differentiation of the species of disease, new material for reflection and new demands upon medical treatment, since they could not be fitted to the old system.

The subsidiary sciences of chemistry (which proceeded from the Arabians) and botany, to which the New World constantly supplied new material, also advanced in numerous and positive ways further into the foreground of medicine, and the same is true of natural philosophy. These sciences above all afforded aid to medical investigation, and have thus given to the latter a powerful impulse even up to the present time. Anatomy, newly created at the close of the Middle Ages, and the physiology founded thereon, now first exercised an influence, more especially upon the learned, theoretic side of medicine. This influence, though not glaring and speedy, was therefore only more enduring and profound. To this was united pathological anatomy.

Through definite observation, which now supplied material in every way better and immense in amount, the field of medicine was so extended, that by degrees there appeared a division of labor, which seems to have not quite reached its climax even to-day. At first this division took place under the idea of the unity of medical science, but in the end it seems to have terminated in the exactly opposite theory.

As the result of the prominence of the method based upon actual facts, and in place of the preceding speculation and faith, observation stepped in, and thus the revolution to the new medicine was completed. While Antiquity sought to penetrate into the inmost recesses of human life, especially in the paths of speculation and without occupying itself sufficiently with its phenomena; while the Middle Ages in faith extended their grasp over the temporal world and the terrestrial lever of existence and its phenomena; so the Modern Era, and still more its medicine, seeks chiefly by a careful observation of phenomena to penetrate into the inmost laws of healthy, as well as morbid life. Thoughtful observation[1] then impresses its stamp upon the whole of modern medicine, while philosophy and philology only rarely gain the preponderance. Yet religious belief and superstition still continue to whisper in secret in this department.

Through the struggles which we have indicated the medicine of the Modern Era attained by degrees the grade of development of scientific medicine so-called, the highest grade attainable, according to the judgment of the present day. Yet the universal and humane medicine, founded upon ethics, will one day acquire the pre-eminence even over this.

II. MEDICINE UNDER THE INFLUENCE OF PROTESTANT VIEWS. (THE MEDICINE OF THOUGHTFUL OBSERVATION).

The Sixteenth Century

is one of the grandest and, for humanity, the most important of all history! It laid down new laws and new forms for almost every department of human thought and human knowledge. And not only the lofty, in a social and intellectual sense, often hazarded their all for the attainment of higher intellectual and moral objects, but the common people likewise took part with enthusiasm in the reformation. The learned particularly satisfied their burning thirst for investigation, knowledge and truth, often at the expense and sacrifice of all the pleasures and conveniences of life, both at home and on the journeys which they undertook under the compulsion of this mighty thirst for knowledge. The fundamental chord of the whole century was thoroughly idealistic, and its result was an astonishing creative activity towards every point of the intellectual compass — in religion, the arts, the sciences, technics and social life. So that Hutten, the harbinger of a new era, burst forth into a song of triumph: "O century! Studies bloom, spirits awaken, it is joy to live!" We of later birth, however, may justly cry out: O century! Ours thou wert, the century of German mind! It was without question the time in which the German mind assumed a position of predominance over all people of culture, and addressed itself to all nations. Luther had given to it the watchword: "The time of silence is past and the time to speak has come!" — and the German art of printing spoke with a thousand tongues and in accordance with all the tendencies of the new era! For medicine especially, the sixteenth century is of an importance similar to the age of Hippocrates; for during this era was first enlarged the edifice whose foundation he had already laid. During this period too medicine stepped forth from the fetters of authority and the halls of the universities within the jurisdiction of authority, into a new and vigorous life. It became once more, so to speak, exoteric, after a long period of esoteric confinement in the barriers of the Church and unhealthy thought. The 16th century ripened free investigation, and was in medicine too peculiarly the century of reformation, of struggle and of protest against all medicine which had abandoned the principles of Hippocrates, principles which placed the observation of nature, not the letter of tradition, in the fore-front of knowledge. The levers by which this reformation was accomplished were Humanism, the new anatomy, new diseases and the doctrines of Theophrastus von Hohenheim and Paré (odd as the association may sound). The struggle was intimately allied with Protestantism in religion[1], only medicine went further than religion, and in its own department began to dig up and remove gradually the roots of all faith and the grounds of all authority founded therein, in order to afford room for reason and sight alone.

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[1] From the 16th century onward, therefore, we frequently meet complete collections of "Observationes".

That the 16th century was a century of struggle, in which the old was demolished and the new built up, is very manifest when we consider the services which it rendered to science and the names to which these services are forever united.

Above all Galen and the Arabians were thrown down (though not in the lecture rooms) from their seats of authority, heretofore uncontested, and, on the one hand, the banner of Hippocrates, on the other, that of a new and independent medicine was firmly planted. So fierce was the struggle thus begun, that it stirred to its very bottom the whole medical world of the period. Opinions clashed so strongly against each other, that even the temporal power was at one time called upon to aid in opposing the innovations. Upon this battle-field gleamed the name of Paracelsus, and here that of Brissot became prominent.

The sixteenth century is likewise the golden age of the great anatomists, of Vesalius, Falloppio, Eustachi, and all the others, who, partly by the genuine excellence of their work, partly too by the newness and consequent fertility of their field of labor, became immortal in the department of anatomy.

Surgery and midwifery also received a new impulse. This is evidenced by the single name of Ambroise Paré, and by the single fact that in this period occurred the reintroduction of that most beneficent operation, podalic version, and the performance of the first Cæsarean section upon the living woman. Ophthalmology was likewise newly founded, and the subsidiary sciences of botany and chemistry were made subservient to medicine. Yet chemistry still wore the deceptive cloak of alchemy, which, together with other forms of folly, Cabalism, magic, astrology, chiromancy and necromancy, still held even the best minds in its toils.

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[1] It is manifest that the partisans of the Protestant movement in medicine were not necessarily all of them actual followers of Protestantism in religion also. Their work, however, brought them into intellectual relations with the latter.

The revival of the study of the genuine writings of the Ancients[1] brought once more improved artistic, historical and philosophical views (which had been so long wanting), and with them a pagan soberness of thought and clear and more beautiful forms and language.

In addition to the earlier universities, those founded more recently in Germany — Wittenberg[2] (1502), Frankfort-on-the-Oder (1506 or 1499, removed to Breslau), Marburg (1527), Königsberg (1544), Strassburg (1566), Jena (1557), Helmstädt (1575), Altdorf near Nuremberg (1571), Herborn (1584), Gratz (1585), Paderborn (1592) and others in other lands[3] — with scientific efforts limited by statutes and entirely consonant to the spirit of the age, contributed their share to the cultivation of these innovations. They promoted medicine in this century more than in the preceding, although these institutions were still designed purely for teaching (as they are to-day) and not for investigation. The so-called "Academies" of savants, associations which took their name from the example of Plato (now revived), were institutions designed exclusively for investigation.

1. INFLUENCE OF PHILOSOPHY (ASTROLOGY AND THE ALLIED BRANCHES), THE NATURAL SCIENCES, MATHEMATICS, THE ARTS AND PHILOLOGY UPON THE MEDICINE OF THE SIXTEENTH CENTURY.

For the comprehension of the often contradictory phenomena and struggles of the sixteenth century in the field of medicine, a consideration of the general tendency of thought (which made itself felt of course in medicine, as in all other sciences) is more necessary than for any other period.

Beside an earnest effort to advance, a retrograde impulse of equal strength manifested itself; beside the clearest discernment appeared the darkest superstition; beside poor dupes stood the grandest impostors; beside philanthropic efforts were deeds of the most terrible delusion; in short we observe a collection of revelations and riddles of the human mind and of national psychology, such as no other period can offer.

In the field of philosophy, especially in Italy, there had occurred as early as the preceding century a revival of the (ideal) Platonic philosophy, as a reaction against formal, realistic (Aristotelian) Scholasticism. This, however (and the point is of interest in the history of culture), under the influence of mediævalism, soon terminated in Neo-Platonism, and allied itself with Cabalism, with which it stood in close relations at an earlier period. In Germany even the learned, though superstitious, Reuchlin (a benefactor of Germany by his diffusion of a knowledge of Greek and Hebrew), as we have already mentioned, embraced Cabalism, and in 1517 published a pregnant work "De arte cabbalistica", in which, in the failure of other evidence, he brought forward the Cabala as the best support to the doctrines of the Trinity, the Godhead of Christ etc. Of the same opinion were his contemporaries Francesco Giorgio (Dardi, 1460–1540), a Minorite, and his pupil, the farmer's son Joh. Heidenberg, named Trithemius (1462–1516), of Tritheim near Treves. The latter became abbot of Sponheim near Kreuznach, and was one of the chief disseminators of Cabalism in Germany.[1]

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[1] Hence this whole period received, as we know, the title of the "Era of the Renaissance".

[2] Raised to world-wide historical fame by the labors of Luther, and the first university established by the state, as well as the first Protestant university, in Germany.

[3] Toledo (1518), Seville (1531), Granada (1531), Leyden (1575), Edinburgh (1582), Venice (1592), Dublin (1593), Parma (1599). (H.)

Another famous Cabalist was the notorious and quixotic theosophist HEINRICH CORNELIUS AGRIPPA VON NETTESHEIM (1486–1535), a man interesting from the course of his destiny and the originality of his mind, incomprehensible from the contradictions of his doctrines and his life, and probably rather a deceiver than a dupe.

Born in Cologne on the Rhine, as early as his 24th year he taught Cabalism in Dôle, in accordance with Reuchlin's book "De Verbo mirifico". In 1510, banished through the influence of the monk Catelinet, he went thence to London, and from this city to Pavia, where in 1515 — an evidence of the odd tendency of the universities of that day — he expounded the spurious "Hermetic Books".

But the fickle Proteus did not remain here. Entering the military service, he roved through the half of Europe, became a lawyer in Metz, but expressing some views opposed to the belief in saints and witches,[2] sensible in themselves, but dangerous at that time (as they would be in certain places to-day), he was forced to fly. Next he was a physician at Freiburg in Switzerland, then at Lyons, and finally in the train of the queen of France. Declining, however, to predict the future for his royal mistress he was dismissed from her service, and again compelled to become a wanderer, until at last he found in 1535 his first and last permanent home in the grave at Grenoble, after having published a work "De vanitate scientiarum", in which he repudiated everything which he had taught during his life, Cabalism, alchemy, astrology,[3] and all. In his "Occulta philosophia" he teaches the existence of three worlds: a celestial, an elementary and an intellectual. These furnish the subjects of mathematics, physics and theology. From out of bodies and beings flow into space indivisible idols, unaffected by distance, so that by their means e. g. communication may be had with another person across the greatest spaces, indeed over into eternity, as in the modern Spiritualism. The human mind is similar to the anima mundi, which dwells in all bodies, and is attracted from one to another. Hence it is possible for the initiated to produce entirely new matter, and even gold. Sympathy towards similar things and antipathy towards dissimilar things rule all worlds — a Neo-Platonic

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1. Trithemius, though not an entirely legendary character like the Dr. Joh. Faust, whose "history" during the 16th century gave occasion for Goethe's immortal dramatic poem, was regarded as a miracle worker and magician. An actual Dr. George Faust is said to have been the source of the Faust legend.
2. Wier was one of his pupils.
3. Astrology at this period and still later was considered an authorized, "exact" science, which included mathematics, astronomy and medicine, and was therefore taught in the universities, so far as it was independent of magic, that is the effort to accomplish the supernatural by the aid of angels and devils. It requires mention here from its connection with the medicine of that period.

idea — and these influences bring the things of one world into union with those of another. Thus each part of the body is associated with a constellation or an intelligence, i. e. a demon. Of these demons every man possesses three: a celestial one from God, another from his birth, and a third from his constellation and the heavenly intelligence. These demons are lords of the four elements and of the constellations. But since the planets influence the destiny of man, so the spirits also have indirectly an influence upon man's fate. By fumigation with "corresponding" materials, as well as by the use of certain words, they may be made obedient, and in this way they may be expelled in diseases, of which they are the authors and the cause. The most powerful words are those of the sacred Hebrew tongue. Numbers too contain supernatural powers. Thus e. g. verbenaca,[1] cut at the third joint, cures tertian fever; but if separated at the fourth, it cures quartan! Finally, by the aid of curious scales of trinity, duality etc., the three worlds above mentioned were so divided that an infinity of worlds and a world full of nonsense originated.

Similar to the above were

FRANCESCO GREGORIO ZORZI ("Venetus", the Venetian, from his native city, died 1536) and

HIERONYMUS CARDANUS (1501–1576) of Pavia,

"the wisest fool and most foolish wise man" of his time. Descended from a lovely pair — his mother lived apart from her husband and endeavored in vain to destroy the offspring of her union (the future Cardanus), while the father continually maltreated his son — he passed through a youth of constant ill health, having survived an attack of the plague shortly after his birth. Living under the rod of paternal superstition and unfeeling vulgarity (his father believed himself the possessor of a special "demon" and employed his son as — a servant), it was not until his 19th year that he began to receive ordinary instruction in the gymnasium. By this, however, he profited so fully, and after his father's death he labored so incessantly, that at the age of twenty-one he had become so much a master of medicine, mathematics and philosophy as to be able to dispute publicly upon these subjects. In his 23d year he went to Padua and obtained a livelihood, though a scanty one, by playing chess, an accomplishment in which he speedily acquired great skill. Graduating at the age of 24, he practised in small towns in continual poverty, until in 1534 he was called as professor to Milan. Two years later, however, he removed from this city to Piacenza. From 1543 onward he lived alternately in Milan and Pavia, but in 1550 went to Scotland in pursuance of a call to assume the treatment of a certain archbishop. Returning to Italy, he again lived alternately in the two cities mentioned until he received a call to Bologna, but falling into the prison for debtors, where he spent a year, he died finally in Rome, just as he had attained a better financial position through an annual salary granted to him by the pope.

That under such circumstances a great mind, rather than a good character, may be developed, is shown by the infirmities of Cardanus and the later example of Brown. Cardanus taxes himself with the following infirmities, though some of them may figure rather as the inventions of self-torment, than as actually existing faults: deceit, envy, libidinousness, calumniation, scorn for religion etc. His chronic impotence he laid to the charge of the constellations, claimed for himself a special demon, taught the sympathy of the parts of the body with the stars, believed that beings of a lower order originate in putrefaction, declared that he was one of the seven great physicians who, up to his time, had blessed or afflicted the world, maintained the impossibility of life without suffering, drew the horoscope of the whole world (like a second Christ), and was guilty of many other similar absurdities. Astrology too he called to his aid in the explanation of symptoms and the administration of laxatives — the latter a grotesque and conspicuous piece of quackery which long maintained existence, though since the 17th century it has assumed different forms and is more concealed [1] On the other hand he declares himself in another place entirely free from prejudice against astrology, chiromancy, magic, poisoning and alchemy, and towards superstition and faith in miracles.

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[1] Verbena officinalis. (H.)

The contradictions of which Cardanus, as well as Agrippa, was guilty, must be taken partly as signs of a weak character, and partly as founded in the spirit of an age rich in similar combinations of folly and the clearest insight. This may be seen more plainly from the fact that in the university of Salamanca a special chair for the invocation of the dead, necromancy, existed, and that text-books on the art of chiromancy were published e. g. by Bartholomæus della Rocca (called Cocles), Johannes ab Indagine and Andreas Corvin. This ought not to occasion much surprise, for in our own day even professors publish absurdities of the same kind.

According to the principles of chiromancy, the thumb is under the control of Mars and from its form in any individual may be determined his strength, sensuality and courage; the forefinger is under the control of Jupiter, and it indicates positions of honor; the little finger belongs to Venus, and indicates children and beautiful wives; while the external border of the hand signifies, under certain circumstances, discoveries, catarrhs — shipwrecks and similar disagreeable accidents!

The people were educated to a belief in astrology[2] by almanacs, and, indeed, chiefly by physicians, who at that period frequently got up these calendars, and who must, therefore, be regarded as involved in the same superstition, unless we are willing to condemn them undeservedly, and to regard them as mere advertising charlatans. Even the noble Melanchthon was one of the most zealous champions of astrology, and his son-in-law, the physician Caspar Peucer (1525–1602), professor of medicine at Wittenberg, was a believer in demons. A special figure, inscribed with suitable directions, pointed out the proper places for bleeding under each constellation, and was called the "Aderlassman". That these calendars were also interlarded with prophecies concerning the end of the world etc., should again occasion no surprise, for the same things are to be seen at the present day. But medicine itself was constantly allied with astrology, as e. g. by Peucer's predecessor, Prof. Jacob Milich of Wittenberg, by Corvin, by Michael Nostradamus[3] (1503–1566), a physician and alumnus of Montpellier, by Jacob Pons, who considered astrology one of the preparatory branches of medicine, by Thomas Giannozzi, and very many others.

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1. It began to fade away very gradually before the discovery of Copernicus.
2. The stars during the Middle Ages (and in Antiquity) were regarded as living beings, who exercised an influence over men from their birth and were skilled in giving to men public and private revelations as to the future.
3. Nostradamus's predictions were expressed in quatrain verse and published in "Centuries". The first seven "Centuries" appeared at Lyons in 1555 and gave occasion to the following jeu d' esprit:

"Nostra damus, cum falsa damus, nam fallere nostrum est,
Et cum falsa damus, nil nisi nostra damus." (H.)

The belief in witches too, and the trial of witches (still frequent in the century of the Reformation and not opposed by the reformers themselves), so disgraceful to both human reason and to civilization, must not pass unnoticed, if for no other reason, because they gave occasion to a member of the medical profession, Johannes Weyer (Wierus, 1515–1588), an honest and learned man, but without genius, though immortal for his sound understanding), to stand up first against this superstition, and thus to benefit medicine yet entangled in the bands of astrology.

According to the popular belief alliance with the devil was of three kinds. The man renounced God and went over to the worship of the devil, offering him an oath of allegiance, homagium. This was the method of witches and their assistants. Or the devil took possession of the man during life, converting him into one possessed. This belief the Germans borrowed from Holy Writ. Finally the man might make a compact of mutual obligation, assigning his soul to the devil etc. Even before the introduction of Christianity there existed, beside the worship of the ancestral gods, a service of demons, among whom were the devil (Diabolus, Tiufal, Gott Fol, Voland) and his grandmother. The priestesses, by means of incantation of the goddess of death, could bring stormy weather upon the crops, and destroy the herds. It was they too, probably, who rendered the body and weapons of the warriors invulnerable. They celebrated their sacred ceremonies by night, and offered dark-colored victims to the gods. It was these priestesses especially who, as Hazunser or Hegisten, witches, preserved their own traditions of the old faith far into the Middle Ages. "From the year 1484, after the unfortunate bull of pope Innocent VIII. (1484–1492) entitled "Summis desiderantes", a wholesale burning of witches began in Germany and continued with some interruptions far into the 18th century." (Gustav Freytag). Under the mantle of the religion of Christ, so outrageously abused, the trial of witches was carried on against poor crack-brained creatures (demonomaniacs) and utterly innocent victims. By means of instruments of torture, whose very description makes one shudder, the desired evidence was extorted — all to the greater honor of God! Inquisitors were, indeed, created by pope Gregory IX. as early as 1233, but the fatal beginning was first made in Germany by Heinrich Institor and Jacob Sprenger (author of the witches codex "Malleus maleficarum", 1489) under the authority of the bull mentioned. This bull, as a matter of fact, applied to heretics only, in order to reach whom the better the priests with devilish cunning had exhausted their ingenuity, though they failed to attain their object. The prejudiced civil authorities lent their arm to the execution of their disgraceful decrees, and, indeed, in the law-books witchcraft was enumerated among the crimes! In this way children between the ages of one and twelve years were murdered as witches. In Geneva more than 500 men were burned, and in the Electorate of Treves full 6,500 were in a short time executed. A single executioner — his name was Balthasar Voss — had in nineteen years burned 700 human beings (among them a woman who had given birth to an infant under the torture of the rack, and whose infant was burned with her!), and aspired to bring his number up to a full 1000! The witch-finding inquisitor of course received 12–15 marks for each witch — hence his zeal and their tears! That the Reformers were also involved in the belief in demons is proven by Luther himself, who advised that a possessed maiden should be cast into the river Mulde, and was greatly provoked when he heard that his advice had not been followed! The twelve years old child was simply troubled with a voracious appetite! The epidemic of witch-burning continued until late into the 18th century, and the belief in witches still prevails among the masses! Weyer's footsteps were followed by the theologians Joh. Wagstaff, Balth. Becker, Hieronymus Tartarotti, Ferd. Sterzinger, Spee, J. Gal. Semmler, and the lawyers T. G. Godelmann, Thomasius, prince Wilhelm von Cleve, the elector of Mayence, Joh. Phil. von Schönborn, and others, so that the trial of witches was not abolished until close upon the threshold of the present century.[1]

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[1] The frenzy reached England somewhat later, but raged none the less fiercely. The practice of witchcraft was made a capital offence by a statute of Elizabeth in 1562, and a similar statute was enacted in Scotland in the following year. In 1590 king James VI. of Scotland himself took part in the torture and examination of a number of persons accused of practising the black art against his own person, and thirty of them were executed for the crime on the Castle-hill in Edinburgh. The same versatile monarch in 1597 published a professed treatise on "Demonology". Immediately upon his accession to the throne of England a new statute carefully defining the crime of witchcraft was passed, and henceforth conviction and punishment for this offence became more common. The chief witch-finder of England was one Matthew Hopkins, who, with his assistants, from the year 1644 onward made regular visits to the chief towns, agreeing for the very moderate sum of 20s. to detect all the witches in their neighborhood. In Scotland no official witch-finder seems to have been appointed, but the work was zealously performed by the clergy, who vied with each other in the detection of these malignant offenders. It was during the session of the Long Parliament, however (1640–1644), that the persecution of so-called witches reached its height in England, and no less than 3,000 legal executions on the charge of witchcraft are said to have occurred during this period. As late as 1664 two women, Amy Dunny and Rose Callender, were condemned and executed at Bury St. Edmunds, under the judicial decision of that well-known and upright judge Sir Matthew Hale, and it is said that their conviction was largely due to the opinions and arguments of the famous Sir Thomas Browne, a Doctor of Medicine of Leyden, and author of the work "Enquiries into Vulgar and Common Errors." The first persons of eminence in England to expose the absurdity of the trials for witchcraft were Chief Justices North and Holt in 1694, but a Mrs. Hicks and her daughter, aged 9 years, were condemned and hanged at Huntingdon for selling their souls to the devil in 1716, and the statute relative to the practice of witchcraft was not repealed until 1736.

In America, as the frenzy arrived late, so also it was happily of short duration. A turbulent Swedish woman of Pennsylvania was accused of witchcraft in 1684, and brought to trial before Penn and a jury, the majority of whom were Quakers. The verdict "The prisoner is guilty of the common fame of being a witch, but not guilty as she stands indicted", put an end forever to similar prosecutions in that province. But in New England the superstition was more serious in its results. Here, too, the clergy, under the lead of the famous Cotton Mather and Samuel Parris, were the most prominent inquisitors and persecutors. Mather declared from the pulpit "Witchcraft is the most nefandous high treason against the Majesty on high"; "a capital crime". "A witch is not to be endured in heaven or on earth". In 1688 a poor Irish woman, supposed by some to be "crazed in her intellectuals", was condemned and executed. In 1692 the village of Salem (now Danvers), under the spiritual direction of the minister Samuel Parris, became the scene of the most outrageous cruelties practised under the cloak of the trial of witches. Twenty persons were put to death, and fifty-five tortured or frightened into confessions. The jails were filled with the accused and suspected. But the awakened common-sense of the people soon asserted itself once more, and in 1693 all the prisoners were dismissed or acquitted and the delusion came to an end.

The absurd story of the golden tooth, which a boy of Schweidnitz was said to have possessed from birth, is connected with the history of medicine only from the fact that it was a physician of that town, Jacob Horst (1537–1600), who, in accordance with the superstition of his time, in 1595 prophesied from this miracle the approach of the Golden Age (which physicians at least, as we all know, in spite of Horst, do not yet enjoy). Other forms of the dark spirit of this age, the search for the philosophers' stone and the art of making gold, are interesting, however, from the fact that it was chiefly physicians who busied themselves with such investigations, and again that chemistry, which has proved so useful in medicine, originated therefrom. Indeed there is no folly so gross that it may not bring with it something good.

A revival of the philosophy of Aristotle speedily appeared in opposition to the Platonism and Neo-Platonism, with which the phenomena just mentioned, the offspring of perverted spiritual life, stood in genetic connection. Among the adherents of this philosopy in Germany were Luther and Melanchthon, that immortal, but modest teacher of Germany, to whom the Germans owe more than to all the universities of that day combined. Yet Melanchthon too was not exempt from Neo-Platonic vagaries. The new Peripatetics based their views, for the most part, on the genuine works of Aristotle, though some of them adopted his views as corrupted by the Arabians. The earliest among them was

PIETRO POMPONAZZI (Pomponatius, 1462–1525),

who, in his skepticism founded in profound reflection, declared himself opposed to cabalistic, astrological and all other absurdities, including miracles and even the immortality of the soul, which latter seemed to him an assumption incapable of proof on the grounds of reason. Allied to him in thought was the physician

ANDREA CÆSALPINO (1519–1603),

whose conclusions led him to outspoken pantheism. — Among the followers of Pomponazzi were

SEPULVEDA (died 1572), a Spaniard;

GIOVANNI BATT. PORTA (1535–1615),

inventor of the camera obscura in 1588, an opponent of the belief in witches and a predecessor of Lavater in the science of physiognomy;

AGOSTINO NIFO (1473–1546) of Calabria,

a famous physician and glorifier of female charms. Next the latter stood

MARC ANTONIO ZIMARA (died 1532),

a professor in Padua, and later

LUCILIO VANINI (1585–1619),

who was burned at the stake as a rejector of God and therefore a most mischievous heretic, and others. — On the other hand

PIERRE DE LA RAMÉE (Petrus Ramus, 1515–1572),

who was slain in the massacre of St. Bartholomew's night, was a hearty scorner of Aristotle. He was followed by the numerous schools of Ramists, who fell into dissensions with the partisans of Aristotle similar to those which took place between the Realists and Nominalists of the Middle Ages.

Bernardino Telesio (1508–1588) of Cosenza,

the founder of a special academy of natural philosophy (Telesian or Cosentine) and a partisan of the Eleatic philosophy, was likewise an opponent of Aristotle.

Franciscus Patritius (Patrizzi, 1529–1597)

also appeared as an opponent of Aristotle with a Neo-Platonic, Christian, mystic and pantheistic natural philosophy, as did also

Giordano Bruno of Nola (1548–1600),

who, after abandoning the Dominican order and wandering about through France, England, Germany and Switzerland for eleven years, imprudently returned to Rome, and was there burned as a heretic. He was the first to teach that the fixed stars were like our sun, and to inculcate the eternity of the universe. In 1879 his statue was set up before the very eyes of the pope — such has been the change in the spirit of the times!

Besides these philosophic sects, which chiefly led and indicated the active mental struggles of the 16th century, there also appeared, though less aggressively, certain partisans of the Stoa like

Justus Lipsius (1547–1606),

and skeptics like that scorner of medicine

Michel de Montaigne (1533–1592),

the first important skeptic of the modern period, and as such of great influence upon the skeptical tendencies of the French and English during the two succeeding centuries. Montaigne was bold enough to call the belief in witches a palpable absurdity.

In the 16th century the natural sciences (entering also upon their reformation) began silently to exercise upon the course of medicine that influence which is to-day so excessive. This was effected chiefly by the botanical and pharmacological results of the travels of savants, incited by the active impulse toward discovery, investigation and travel, so characteristic of that age. The Portuguese physicians

Garcia del Huerto and

Christobal da Costa,

both finally residents of Goa, were the first to take advantage of the opportunities offered by the colonies of their fellow-countrymen on the coasts of Africa and in India. They were followed by the Spaniards

Gonzalvo Hernandez Oviedo y Valdez (1478 until after 1547),

the famous viceroy of Mexico, and

Nicholas Monardes of Seville (about 1580),

both of whom described the medicinal plants of the New World. The latter was in 1569 the first person to mention coca. The Frenchman

Pierre Belon (Belonius, 1518–1564),

in his travels through Greece, Egypt and Asia Minor from 1546 to 1549, thoroughly investigated the ancient Orient for information respecting old drugs and in search of new ones. The same was done by

Leonhard Rauwolf of Augsburg (died 1596),

who in 1573–76 travelled throughout the entire Orient. Finally

Prosper Alpino (1553–1617),

secretary of an embassy to Egypt, the most famous of all the Venetians and "the last of the Methodists" (he endeavored to revive the doctrines of that sect), traveled throughout the whole of Egypt from 1580 to 1583. On his road home he visited

Crete and Greece, and entered the service of Andrea Doria (1468–1560), for whom he went to Geneva. Responding, however, to an honorable recall to his home, he returned to his native city, which conferred upon him the professorship of botany at Padua. Among his more important works were his "De plantis Ægypti liber", "Historia Ægypti naturalis", "De medicina Ægyptorum" etc.

Otto Brunfels (died a physician in Berne in 1534),
born in the castle of Brunfels near Mayence, distinguished himself by his labors in botany. Declining to copy the Ancients, he observed for himself, and was the first physician to furnish good plates of plants. He was followed by

Valerius Cordus[1] (Cordi, 1515–1544, died in Rome),
the discoverer of sulphuric ether. "His early death was regarded as a general misfortune" (Ranke).

Hieronymus Tragus (1498-1560) of Heiderbach, near Bretten,
a physician of Zweibrücken, superintendent of the gardens of the prince, and subsequently a resident of Hernbach, was a man of reputation and political influence. His real name was Bock, but the pedantry of the age converted good German names into Greek or Latin equivalents. Bock was also an evangelical minister.

Leonhard Fuchs (1501-1566)
and Tragus's pupil

Jac. Theod. Tabernæmontanus (died 1590) of Bergzabern,
physician to the Elector of Speyer and subsequently in Zweibrucken, and in his quality of honorary citizen of Worms a predecessor of Bismarck and Moltke. He had eighteen children, of whom two sons were likewise physicians. Tabernæmontanus also rendered valuable service in the study of medicinal springs.

Melchior Wieland (Guilandini, died 1589),
superintendent of the botanical garden at Padua and subsequently a professor of botany and medicine in the same city, carried on a continual literary quarrel with Mathiolus. Among the Italians the following acquired reputation as botanists:

Pietro Andrea Mattioli (Mathiolus, Matthiole, 1501–1577, died in Florence):

Bartholomæus Maranta (about 1559);

Luigi Anguillara (about 1561);

Andrea Cæsalpino (1524–1603),
who has been already mentioned, and who, like Linnæus, classified plants artificially in accordance with their organs of reproduction. Among the Netherlanders,

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[1] Cordus was the author of the first official Dispensatory, whose printing and introduction into the pharmacies of Nuremberg was authorized by the Senate of that city in 1535. He was likewise the son of that Euricius Cordus (1486–1535), professor of medicine in Marburg, whose epigram is (or should be) known to every doctor:

"Tres medicus facies habet: unam quando rogatur
Angelicam; mox est, cum juvat ipse, Deus:
Post; ubi curato poscit sua præmia morbo,
Horridus apparet, terribilisque Sathan."

"God and the doctor we alike adore
When on the brink of danger, not before.
The danger past both are alike requited,
God is forgotten, and the doctor slighted." (H.)

Rembertus Dodonæus (Dodoëns, 1517–1586),

Carl Clusius (Charles de l' Écluse, 1526–1609) and

Matthæus Lobelius (1538–1616),

ordinary physician of James I., distinguished themselves in botany. On the other hand in physics the famous ordinary physician of queen Elizabeth,

William Gilbert (1540–1603),

was the discoverer of electricity in the resins, glass and certain precious stones: of static electricity; the repulsion of similar, and the attraction of dissimilar, poles of the magnet; the diversion of the magnetic needle by electricity: the strengthening of magnets by an armature: the fact that iron bars become magnetic along the magnetic meridian; that the earth itself is an enormous magnet etc.

Mineralogy also found its cultivators. In Germany were:

Georg Agricola (Ackermann, 1494–1555) of Glauchau,

the discoverer of bismuth, who studied mineralogy systematically after the Ancients and his own observations, laid the foundation of geology, and collected a cabinet of natural curiosities;

Kaspar Schwenckfeld (1490–1561),

both of the latter physicians, the former in Chemnitz, Schwenckfeld in Hirschberg and Görlitz; the Dresden physician

Johann Kentmann (1518–1568) and

Christoph Enzel (Encelius),

the minister. In France we may mention

Palissy (died 1590),

and in Italy

Aranzi.

The chief promoter of Zoology was

Ulysses Aldrovandi (1522–1605) of Bologna,

where in 1567 he established a botanical garden.[1] He left to his native city, where his decendants are still living, a collection of natural curiosities which is still in existence. His writings are devoted to all classes of animals, both the higher and lower. Another eminent zoologist, who surpassed, however, all those mentioned as a universal investigator of nature, and manifested a love for science under adverse circumstances exhibited by few only, was

Conrad Gesner (1516–1565) of Zürich, the "German Pliny".

He practised in Zürich, Strassburg, Paris, Venice, Augsburg and other places, until poor, sick, and almost blind, he was finally (1555) appointed professor of natural history in his native city. Thirty-nine works were the fruit of his untiring and inextinguishable zeal. Gesner was the first writer to essay a classification in natural philosophy. "He rose to the idea of adding descriptions to names, and of collecting in a comprehensive work on the animal world all that was known in reference to it. The talent for compilation is not so common as is generally believed. Compilation, to be of service to science, must not only proceed from extensive and varied reading, but it must be founded upon genuine interest and personal knowledge, and must be controlled by definite ideas. A talent of this kind was one of the greatest qualifications of Conrad Gesner" (Ranke).

The advances of mathematics and astronomy under the influence of the Copernican system laid the foundation for the final disbelief in astrology.

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[1] A public botanical garden existed in Venice as early as 1333 (Marx).

The popularizing of these advances (by Adam Riese, whose arithmetic is still proverbial) and the rectification of the calendar (by Ignacio Danti and Aloysio Lilio with the German Clavius) under Gregory XIII. (in 1582 ten days were dropped out[1]) gave to the common people new conceptions and notions. Mathematics laid the foundation of the exact treatment of medical subjects in the following century. The arts, especially painting and sculpture, stood in relations of mutual interest with medicine, especially with anatomy.

Wood-cuts and copper-plates served as means for the diffusion of artistic works in this science. The great painters ennobled the works of the great anatomists, and the latter gave to the former, so to speak, the scientific principles of their art. We need mention here only a few names, in order to indicate the greatness of their productions. At the head we must place the Italians Raphael, Titian, da Vinci, Michael Angelo, Correggio (1494-1534), Fra Bartolomeo (1469-1517), Paolo Veronese (died 1588), Guido Reni (1575-1642) and others. Among the Germans were Albrecht Dürer (1471-1528), Lucas Cranach (1472-1553), Hans Baldung Grier (1476-1552), Hans Holbein the Younger (1497-1553), Hans Schaeuffelin (1492-1540) etc. The tendency of the arts, in unison with the other branches of culture, was directed towards the ideal and the religious. Even music shows this, as whose Catholic representative we may mention Palestrina (1524-1594), while Luther, who, as we know, valued music very highly, may be called the creator of Protestant Church-music. A notable impulse to the generalization of this art was given by the invention of movable note-types by Ottavio Petrucci of Tossembrone in the States of the Church in 1502.

The activity of numerous physicians of the 16th century in philology, and in translating and commenting upon the works of the Ancients, was of greater immediate influence upon the medicine of that time than the studies just noticed. The latter did not manifest their full effect until the succeeding age. Philology was the mother of modern medicine, and with the help of the Ancients reared medicine and the natural sciences. By the labors of these physicians a finishing stroke was prepared for the Arabists or scholastic physicians; observation was opposed to the proofs and subtilties of authority; the writings, methods and practice of Hippocrates were brought into the foreground, and an improved linguistic treatment of medical subjects was also introduced. In fact there arose a genuine apotheosis of Hippocrates and the Greeks in general, which has been designated disparagingly a "Grecomania". — Most of the physicians belonging here merit honorable mention also in the history of philology. Among these Germany is best represented, both as regards number and importance. The line of German cultivators of the Ancients is opened by the famous

Winther von Andernach (1487-1574),

a teacher in Goslar and professor successively in Louvain, Strassburg and Paris, finally ordinary physician of Francis I. and baron of the empire. He translated the works of Oribasiaus, Paul of Ægina, Alexander of Tralles, Cælius Aurelianus and Galen. According to Puschmann he likewise foisted upon the public a text of Philumenos and Philagrius, which he had himself prepared, and thus became a literary forger. But as the same thing was done with respect to other ancient writers, particularly at that time, by various philological coryphæi *quasi exercitii causa*, Winther's transgression must be judged more charitably than it would be at the present day. Winther finally became a Protestant and is buried at St. Gall.

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[1] The new calendar was speedily adopted by all Roman Catholic countries, but the Protestant states of Germany and Denmark adhered to the Julian calendar until 1700, and England did not adopt the improvement until 1752. (H.)

Hieronymus Gemusæus (Geschmaus, died 1543)

devoted his time to translations of Theophrastus, Galen and Paul of Ægina. Both these physicians were surpassed in extent of study by

Janus Cornarus (properly Johann Hagenbut, 1500–1558) of Zwickau,

professor in Rostock and Mecklenburg physician-in-ordinary, who translated the works of Hippocrates and wrote commentaries on Galen, Dioscorides and Aëtius.

Leonard Fuchs (1501–1565),

originally a schoolteacher of Wendingen in Suabia, subsequently professor in Tübingen and a bitter rival of Cornarus, was a most violent opponent of the Arabians, declaring that the longer continuance of their science would promote the overthrow of Christianity. He wrote commentaries on Galen and Hippocrates.

Johann Lange (1485–1565) of Löwenberg in Silesia,

a friend of Melanchthon and Peucer, was likewise an opponent of the Arabians, and in his "Epistolæ medicinales" combated their uroscopy and advocated Greek semeiology.

Theodor Zwinger (1533–1588) of Basel

also contributed to a knowledge of Hippocrates, and the two

Scaligers (Julius Cæsar, 1484–1558 and Jos. Justus, 1540–1609)

wrote commentaries upon certain of the ancient authors. Many German translations of the ancient physicians appeared in the 16th century, e. g. Pliny's "Historia Naturalis" by H. Eppendorf in 1543; Celsus by Khuffner, 1532; Vegetius Renatus, 1532; Dioscorides by Danz of Ast. Joh. Sambucus (1531–1584) published an historical and biographical work concerning physicians and philosophers, particularly those of the 16th century. This work was adorned with copper plates.

Among the French

Jacob Hollerius (Houillier, 1498–1562),

François Rabelais (1500–1553),

long a professor of medicine in Montpellier, but far better known as the witty author of the history of Gargantua and Pantagruel;

Johannes Gorræus (de Gorris, 1515–1577)

Ludovicus Duretus (Duret, 1527–1586)

and most important of all the students of the great physician of Cos,

Anutius Foësius (Foes, 1528–1595) of Metz,

rendered eminent service in the introduction of Greek medicine, especially that of Hippocrates, and in the struggle against the Arabians. The Englishman

Johannes Caius[1] (John Kaye or Key, 1510–1573) of Norwich,

professor in Cambridge, bestowed his labors upon Galen, Celsus and Scribonius Largus, while the Portuguese

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[1] John Caye (Kaye), as one of the eminent benefactors of medicine in England, deserves perhaps a more extended notice. Born in Norwich, Oct. 6, 1510, he was educated at Gonville Hall, Cambridge, and subsequently visited Italy, where he studied medicine under Montanus and Vesalius at Padua. Graduating at

LUDOVICUS LEMOSIUS (about 1580),

and the Italians

GIOV. BATTISTA MONTE (Montanus, 1497–1557) in Verona,

HIERONYMUS MERCURIALIS (1530–1606) of Forli,

professor at Padua, Bologna and Pisa, and the first of the Moderns to recommend medical gymnastics, as well as the author of the first special treatise on diseases of the skin (De morbis cutaneis libri II etc., Venice, 1570), and

MARSILIUS CAGNATUS (Cagnati, died 1610),

devoted their attention to the determination of the genuineness of the ancient authors, particularly Hippocrates and Galen, and to the improvement of their text.

The so-called "Conciliatores" rendered excellent service to medicine by comparing the Arabians with the Greeks and reconciling their differences. The most eminent of these were:

SYMPHORIANUS CAMPEGIUS (Campier, 1472–1539).

a medical star of the first rank in those days, who resided in Lyons;

FRANCISCUS VALLESIUS (died 1572) of Covarrubias near Burgos,

ordinary physician of the fanatical Philip II., who fell a victim to phthiriasis and once gave to his physician 6,000 crowns for curing him of a fever:

JUL. ALEXANDRINUS VON NEUSTAIN (1506–1590) of Trent;

NICOLAUS RORARIUS (Rorario, about 1572) of Udine;

JOH. BAPTIST. SYLVATICUS (1550–1621),

professor in Pavia, and the great Spaniard

MICHAEL SERVET (according to others Miguel Servede-y-Reves, 1509–1553) of Villanova in Aragon, though born at Tudela in Navarre,

the unfortunate, but enlightened victim of the overbearing and fanatical Picard, John Calvin (Jean Cauvin, 1509–1564), at whose instigation he was very slowly (!) burned at the stake as an heretical opponent of this heretical pope — to his own eternal honor and to the everlasting disgrace of his malignant enemy. In his treatise entitled "Syruporum universa ratio etc.", on account of which he was impeached before Parliament by the Faculty of Paris, he showed himself as free from bigotry in the sphere of medicine as in religion. The enlightened Parliament, however, acquitted

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Bologna, in 1543 he traveled throughout Italy, engaged in the collation of the MSS. of Galen and Celsus for the purpose of improving the text of these writers. On his return to England he took the degree of M. D. at Cambridge and settled in Shrewsbury, but was soon summoned to London by Henry VIII. to deliver lectures on anatomy to the surgeons of that city. He became a Fellow of the College of Physicians in 1547, and was the president of that College for seven years. He also compiled its Annals from the date of its origin down to his own times. At his instigation an establishment was founded for the annual performance of two public dissections of human bodies — the first of the kind in England. During the reign of queen Mary, Caye obtained a license to convert Gonville Hall into a college, under the title of Gonville and Caius College. This institution he liberally endowed, and was also its first master. The best known of Caye's literary labors is his "Boke or Counseill against the Disease commonly called the Sweate or Sweatyng Sickness", which appeared at London in 1552. A Latin version of this work, considerably enlarged, was published in 1556. Caye died at Cambridge, July 29, 1573, and his grave was marked by the simple epitaph "Fui Caius". (H.)

him. Servet is immortalized, however, by the fact that he was the first among the Moderns to revive the idea of the pulmonary circulation (1553), including the impermeability of the septum ventriculorum, an idea which he brought forward in his religious treatise "De Trinitatis Erroribus",[1] and failed to explain entirely satisfactorily only because of his conjoined use of the vital spirits and the blood. His statements were thus obscured by ideas consonant with the spirit of his age. He gives the lesser circulation "not as ordinarily described", but correctly, and is acquainted with the change effected in the color of the blood in the lungs. On the other hand he still thinks that spirits, not plain blood, flow from the lungs into the left auricle.

2. REFORM OF THE PRACTICAL BRANCHES.

a. Medicine.

The revolution in medicine, prepared during the latter portion of the Middle Ages and consummated in the 16th century, first showed in the practical departments its palpable effect upon the life of the age, while the other branches, especially anatomy, were only secondarily and silently concerned therein.

The reform proceeded from no single individual (as we now and then read perhaps of Paracelsus), nor from several; indeed from no one nation alone. Individual men formed merely the heralds of the reformative ideas of this period, and these reformers then, as almost always and everywhere, sprung up by the grace and the necessities of the time; were rather driven and borne along by its ideas, than the sole and independent creators of them. They had innumerable co-workers, who, by quiet contributions, interested themselves in the good work, or rather furnished the ground work of that picture on which the glowing figures of the reformers stood forth so prominent.

The struggle was directed against the Arabians and Galen, and terminated with the demolition (though incomplete) of those intellectual bulwarks of mediæval medicine.

A purifying combustible was first cast into the stagnant air of blind faith in authority and of scholastic practice in the form of a struggle concerning the proper place for venesection in pleurisy (pleuritis and pneumonia). Over this subject of dispute, so insignificant in appearance to us of the present day, was awakened at that time a most wide-spread and significant excitement of the medical world, which divided the latter formally into two camps. The place for bleeding was the shibboleth by which the conservatives and the men of advanced ideas were recognized. Here too, as is usually the case in times of revolution, the partisans of the views heretofore prevalent were stronger in numbers than those who were disposed to favor the new ideas.

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[1] This must be a lapsus calami. Servetus's description of the circulation is contained in his "Christianismi Restitutio", which was printed in 1553. The entire edition was condemned to the flames, and but two copies of the original work are known to be now in existence, one in the National Library at Paris, the other in the Imperial Royal Library at Vienna. From the latter copy a small edition in fac simile was reprinted at Nuremberg in 1790. The passage on the pulmonary circulation was quoted for the first time in an English book by Wotton, "Reflections on Ancient and Modern Learning", London, 1697. (Dalton.)

The later Greeks, and with them the Arabians, their pupils, had taught that at the outset of inflammation blood should be taken at a distance, and on the opposite side, from the seat of disease, in small quantity, slowly and drop by drop; since abstraction of blood in the vicinity of the diseased part, especially if considerable, only attracted still more blood into it and thus weakened the part. That procedure by which the fluids were diverted from the diseased to the causative part or organ, for the purpose of removing the disease (e. g. to the uterus in inflammations occasioned by suppression of the menses), was called "derivation", in contrast to the Hippocratic "revulsion", which provided for free venesection in the vicinity of the diseased organ and upon the same side. The Hippocratic method of venesection, which in these times seemed an extremely dangerous innovation, to be combated by every possible means, was first taught by

Pierre Brissot of Fontenay-le-Comte in Poitou (1478–1522), who practised in Paris. Through the results of this doctrine, which scattered many fruitful seeds of knowledge and at the close of the century was fortunately victorious, Brissot became a reformer of practice almost as great as Theophrastus von Hohenheim.

Thoroughly versed in the teachings of the Greek authors, Brissot had long been quietly a follower of the Hippocratic method of bleeding, until he ventured in 1515 to step forth openly in its defence, having once more experienced its manifest advantages on the occasion of an epidemic of pleurisy. He maintained also that both derivation and revulsion might be undertaken on the same bloodvessel. He won over to his views Villemore and Helin, members of the Faculty of Paris, "a rare triumph", but gained also many more opponents, who even succeeded in procuring a parliamentary interdiction of his method. Influenced by this and by his love for the natural sciences, Brissot then went to Portugal, where in 1518 he — a matter of very little difficulty — aroused the envy of Dionysius, the physician-in-ordinary, against whom he wrote a treatise "Apologetica disceptatio, qua docetur, per quæ loca sangnis mitti debeat in viscerum inflammationibus, præsertim in pleuritide" (first published in 1525 by Brissot's friend Luceus of Evora). Strange to say, too, the Faculty of Salamanca, to whom the court-physician had appealed, decided in favor of Brissot. Charles V. was also solicited to extirpate the new heresy, which was equally objectionable with Lutheranism. Fortunately, however, one of the emperor's relatives had recently died of pleurisy in spite of the Arabian method of bleeding, and this fact alone probably averted the burning of numerous medical heretics also, for burning was not at that period an exclusively Spanish fashion.

The steadfast defender of his own doctrine and that of the Ancients obtained many followers, as well as numerous opponents, and the number of both furnishes sufficient evidence of the profound importance and effectiveness of his action, the significance of which in that day is no longer fully comprehensible to us. It was, at all events, of such importance that it divided the physicians of a whole century into two parties. The fact too that the weightiest names were represented in these parties argues in favor of the extent of the struggle, which excited especially the Roman physicians, who, as we know, are not even to-day thoroughly decided on the employment of venesection.

The opponents of Brissot took their stand partly upon "The authorities", partly on speculative considerations, partly on anatomical facts either misunderstood or imperfectly known, and partly too on the pure spirit of contradiction. Among them we find such names as: Diomedes Cornarus (1467–1566), physician-in-ordinary; the famous Winther von Andernach; Benedictus Victorius (Vettori, born 1481), professor in Bologna; Victor Trincavella (1496–1568), a physician of Venice, professor in Padua; Anton. Donatus of Altomare (Antonio Donato d' Altomare, 1508–1566), a physician of Naples, and one of his most zealous opponents; Giov. Argentieri (1513–1572), in other respects a friend of the advanced ideas; Andreas Thurinus (about 1525), ordinary physician of Clement VII. (1523–1534) and Paul III. (1534-1549), and author, among other things, of a treatise on the benefits of spring-waters; Thomas Erastus (1523–1583), the enemy of Theophrastus von Hohenheim, a professor in Basel and Heidelberg, and a very learned Humanistic physician; Thomas Augenius (1527-1603), professor in Turin; Cæsar Optatus (about 1536), a physician of Venice; Ludovico Panizza (about 1544), a physician of Mantua; Mariano Santo di Barletta (died 1539); Nicolaus Monardes (about 1563) of Seville; Conrad Gesner; Joh. Bapt. Sylvaticus and others.

On the side of Brissot stood physicians of no less weight: Joh. Manardus (Giov. Manardo); Matth. Curtius (1474–1544) at Bologna; J. B. Montanus; Hieronymus Cardanus; Christophorus a Vega (1510-1580), professor at Alcala; Mercurialis; Symphorien Champier; Thaddæus Dunus (about 1540) of Locarno, physician in Zürich; Franc. Cassani of Turin (about 1550); Jeremias Drivere (Thriverius Brachelius, died 1554), professor at Louvain, who, however, took only a half-way position in the struggle, and, like others of those whose names precede and follow, raised his voice in the contest half against a rival and half for the subject itself; Æmilius Campolongus (about 1580), professor at Padua; Vallesius and others. Followers of Brissot on anatomical grounds were the great Vesalius, J. B. Cannani (1540), the discoverer of the valves of the veins, Vidus Vidius and others, while in surgical injuries Ambroise Paré also adopted his views.

That extravagance might follow upon the heels of the reform in bleeding, an elder Bouillaud, Leonardo Botallo, born at Asti in Piedmont in 1530, a pupil of Falloppio, but not the discoverer of the ductus arteriosus (this was known even to Galen) which bears his name, taught that blood ought to be drawn in all diseases, even in those of a chronic character, and that it should be taken frequently and abundantly. This sanguinary doctrine gained many adherents, especially in Italy and Spain; indeed, even to-day it is not entirely vanquished, as the sad case of Cavour testifies.

If the reform of Brissot, however wide a circle it might embrace, was still at base only an outward one, that accomplished at almost the same time by the great German-Swiss Theophrastus von Hohenheim stirred up and revolutionized the whole substance of medicine. In contrast too with the reform of Brissot it affected the German people especially. But, while the French reformer finally received recognition everywhere, the importance and the reputation of the German have been for a long time, and are even to-day often belittled. Whatever was necessary for this purpose has been contributed from the very beginning (in accordance with a well known German custom) by his own countrymen, with his colleagues and his pupils at the head. On the other hand, however, he has been also extolled too highly, especially in the present century.

(Philippus) Theophrastus (Aureolus Paracelsus) Bombast von Hohenheim was born in 1493 (1490, 1491?) in the vicinity of Maria-Einsiedeln, a famous Swiss locality, where even to-day a black image of the Virgin Mary is still fervently worshipped. His father, Wilhelm Bombast von Hohenheim (born 1463), was a physician who studied in Tübingen, had then practised in the vicinity of Einsiedeln, and had married one of the matrons of the hospital connected with the convent. In 1502, however, he settled as physician at Villach in Carinthia, where he died in 1534. To his only son (who seems in his youth to have been rachitic, and whom, in the third or fourth year of his life, a hog, or according to others, his own father, is said to have castrated[1] — a most improbable story) he imparted his first instruction, which included alchemy, astrology and medicine. At a later period Theophrastus received instruction also from Eberhard Paumgartner, a bishop and monk of Carinthia, and from Matthäus Scheyt of Seckau. At the age of 16 he went to the university of Basel, where he enjoyed the instruction of Johannes Trithemius, abbot of Sponheim, and made use of the laboratory of Sigmund von Fugger at Schwatz in Tyrol. Then he travelled around, after the manner of the itinerant students and as a surgeon in the wars: "In the Netherlands, the Romagna, Naples, in the Venetian, Danish and Netherland wars, I have cured a goodly number of fever patients, and, as regards the forty diseases of the body, I have restored to health those whom I found suffering from them." He seems to have also visited the universities, which he in general designates as training institutions: "I was brought up in the garden where the trees are mutilated." To increase his metallurgical knowledge, as well as in great part to earn his daily bread, like many physicians of that day; finally out of a pure passion for wandering, he travelled over half the world, was in Spain, Portugal, Prussia Denmark (where he was probably a military physician), the Orient, Egypt and even Tartary, as he himself relates. Everywhere he listened without distinction to the opinions of physicians, barbers, bath-keepers, executioners, old women and gipsies, "in order to understand the wonders of nature." He busied himself, however, very little with books, and in ten years published no work, a fact which, from his steady devotion to nature and experience (the true text-books of the physician) and from his constant travels, is easily intelligible. In fact he left at his decease the Bible, the New Testament, the Biblical concordance, St. Jerome's "Commentaries upon the Evangelists", and some few medical treatises, simple works, which, as we see, had very little relation to medicine. "Reading never made a doctor, but practice is what forms the physician. For all reading is a foot-stool to practice, and a mere feather-broom." He places a high value upon free thought: "He who meditates, discovers something." In his thirty-second year he returned to Germany and speedily rendered himself famous through his cures. As the result of these, and at the special instance of Hausschein (Œcolampadius), he became in 1527 a professor at Basel, as well as city physician with a good salary. Paracelsus had very many hearers, since he delivered even his academic lectures in the German language — a thing utterly unheard of in the universities of that day, when German literati, as already remarked, were ashamed of their plain German names, and in order to appear truly "learned" translated them into Latin or Greek! He had no hesitation in declaring, in his zeal as a reformer and in the boastful strain of the age, that he was the greatest medical genius of Germany, as Hippocrates (whom he greatly esteemed, and upon whose works he had even written commentaries) had been the first of Greece. As an outward, and in those days popular sign that he had made them substantially a *tabula rasa*, he burned the works of Galen and Avicenna in his lecture room, and said plainly "that all the universities had less experience than his beard, and that the down on his neck was more learned than all the authors." He was reproached with not having been regularly graduated, a charge which was adapted to call forth, and really did call forth, his earnest and humorous defence. Moreover, although he seems to have been weakly, he was a thorough drunkard, in accordance with the custom of the times, in which even princes, true knights of the bottle — whoever could swill the most was king! — considered genuine drinking tournaments as quite appropriate to their rank, went at it as recklessly as Luther, and led an extremely irregular life.[1] In 1528 Theophrastus (who was possibly a clerical physician under vow-

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[1] Hence probably arose his repugnance for women.

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[1] The condition of morals in the good old times may be judged from the following passage of Freytag's "Aus dem Jahrhundert der Reformation". "Prince Maurice of Saxony made the acquaintance of the Bavarian woman, and had also his sport in his lodging, the house of a Doctor Medicinæ. The latter had a grown daughter, a lovely piece, called Miss Jacobina, with whom he took his baths etc. Other princes and nobles, both clerical and lay, also played a pretty part. Thus I was once a spectator when Margrave Albrecht and other young princes, with young bishops (sic!) who were not born princes, went into a drinking bout. . . . . "Young princes laid themselves down upon the ground beside the ladies of princes and counts, especially those of high and noble rank, for they do not sit upon benches or chairs, but costly carpets are spread in the center of the room, upon which they sit comfortably, and can stretch themselves out, hug, kiss, and fondle each other." This was when the emperor Charles V. held the Imperial Diet in Augsburg. The illumination of the table was so simple that a servant held here and there two tallow candles. He had at that time Vesalius for his physician. Charles said "Ubi est noster Carlovitius": "Most Gracious Emperor, he is somewhat unwell!" Then said the emperor in Dutch: "Vesalius, go to the Carlowitz, he is a little unwell, and see that you cure him." "When the emperor wished to drink — which he did *only* thrice during his meals — he made a sign to his Doctores Medicinæ who stood by the table. They went to the buffet, where stood two silver flagons and a glass goblet, the latter of which held full a pint and a half (!), and filled the goblet from the two flagons. This he drank completely, leaving not a drop, though he was forced to draw his breath once or twice before he took the glass from his mouth." Thus did the emperor, who, as we know, was very temperate! yet Theophrastus von Hohenheim has been always condemned for his passion for drink, though at that time every one "swilled it", as Luther expresses it, and it had been already said of the ancient Germans:

"Blue-eyed men and blond of hair,"
"Such the ancient Germans were."
"Lions in danger always, but"
"Lambs in dealing with the cup."

To drinking was not rarely added also the old German passion for gambling and prodigality among all classes. The latter is shown by the example of those widows of the commonalty who were married for the second time, and "on their bridal day walked to the church upon a piece of English cloth, which they had spread from their house to the church: they also made use of the purest, softest Riga flax in their water-closets, to wipe their unmentionables." Such

— Oetter), unmarried and a Catholic in spite of his regard for Luther, fled from Basel, an action which was prompted especially by the fact that he had disturbed his sordid colleagues and the apothecaries[1] in their collusive and disgraceful transactions, and had naturally thus made them his bitter enemies. In a suit for his fee too against a niggardly prebendary (who after his cure wished to pay only six florins instead of the hundred florins previously stipulated), unable to obtain his rights because the Churchman based his defence upon the legal tariff, he abused the court, a course which at that time in the little republic was taken in very bad part. After his flight he went to Esslingen, where he had a house (in which some chemical apparatus was found as late as the present century) and where he remained a long time; then he removed to Alsace,[2] Nuremberg, St. Gall, Augsburg, Pfäffers, Moravia, Vienna, Villach, always treating the sick and imparting advice by mouth and by letter, always followed by pupils, concerning whom, however, like Hegel, he said very little in praise, since they only wished to learn his reputed secret methods. Finally Paracelsus died of disease Sept. 24, 1541, at the "White Horse" in Salzburg; or, according to some, of a wound inflicted upon him at the instigation of his colleagues, though the fissure in the petrous portion of his temporal bone, at all events, did not occur until his grave was uncovered. "Glory to the physician who has completed his days with the arcana, and has lived in God and Nature as a mighty master of the earthly light!"

Theophrastus von Hohenheim was a man of extraordinary power and independence of mind: hence his maxim "Qui suus esse potest, non sit alterius". Although not properly educated in his department, he was possessed of ingenious medical instincts, and through his extensive travels and his exemption from the narrowing and rigid education of the schools of his time was better fitted for the work of a reformer than were the literati of the profession, who trod almost universally the paths of Galen and the Arabians. To the latter it was not agreeable, in fact not even intelligible, when Theophrastus said "The physician should be a traveller. ......Does not travelling supply more information than sitting by the fireside? He who wishes to investigate nature thoroughly must tread her books with his feet. The first schoolmaster of medicine is the corpus and the material of nature. What is it to enter medicine by the right door? Is it through Avicenna, Galen, Mesuë, Rhazes etc., or through the light of nature? "This is the right door, the light of nature!" Again: "As Christ said perscrutamini Scripturas, why should I not say perscrutamini naturas rerum?" If by such hints at an open observation of nature Theophrastus had merely cast the leaven of improvement into medicine,

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were the good old times in which Paracelsus lived. The mediæval Church had not improved the ancient morals, but had rather increased sensuality. In France and England too drinking was openly indulged in, even by respectable ladies. Manners were still so primitive, that in these countries they ate with the fingers down to the year 1608. In Germany, however, forks were used a century earlier; indeed they seem to have been invented here.

[1] "The apothecaries too are my enemies. . . . write short, small and rare prescriptions. . . . the third part of what they give me is not good. . . . this is the business, and for this they cry out against me."

[2] Schlettstadt at that time had a famous school, which at one time contained nine hundred scholars.

he would be sure of an important position in the history of the latter science. But he added thereto apt ideas of great and wide application, though they were enveloped in the fantastic, boasting and superstitious rodomontade of the age. If it is true that from the downfall of all forms of culture, and from the by-gone labors of eminent men, only a few fruitful ideas[1] are ever preserved to the following ages and maintain an active influence upon the future, it must be admitted that Theophrastus von Hohenheim possessed such ideas, and that, as will be seen, these still maintain their influence, even at this late day. He, however, like all those who minister to the true benefit of mankind, and who must consequently face the coteries and petty vanity of the putative lease-holders of the wisdom and learning of their age, the envy, the secret and open dishonesty and the prejudices of their time — even the unprofessional dress of Paracelsus was made a reproach to him — he, I say, became a martyr in his struggle. Poverty was his portion, so that he was forced to say sorrowfully, "They who labor in the arts, if there were no trees, would have no shade." To this were added calumny and the ingratitude of common minds, at the head of which latter class stood his "trusty" pupil Joh. Herbst (Oporinus). Undoubtedly he frequently laid himself open to his enemies, and his own undeniable failings and weaknesses were therefore naturally made the most of by the latter. Yet his faults — and the history of culture must confess it — were for the most part rooted in the rudeness, or if you will, in the natural exuberance and simplicity of the manners of that age, whose undisguised son Theophrastus was in both the good and bad senses of the expression. This rudeness was so great that e. g., as before mentioned, it was considered a becoming amusement of a high nobility for lords and ladies, reclining on carpets, to feel of the clothed portions of each others body in simple sport. Roughness, coarseness, rude manners are indicated by Theophrastus himself too as the fashion of his time and his country, just as rudeness is the fashion of the Swiss to-day. Compare also the charming titles exchanged by Luther and his adversaries, and the "Polsterdoctoren, Kalberärzte, Sudelköche" and the like of Theophrastus may perhaps appear rather joking expressions, than characteristics of his exceptional rudeness; or they may be credited in part to a rough doctor's humor, like his dubbing of medicinal mixtures "Beschissgruben", a term certainly quite characteristic of the age, although it may have contained also a germ of truth. At all events Theophrastus possessed humor in a high degree. He abandoned the Ancients: hence those physicians who depended upon the Ancients called him a heretic and a barbarian, although in those days obscenity of expression was common even in polite society, and boxes on the ear were administered by the hands of queens themselves.

How the character and practical services of Theophrastus were judged in unprejudiced circles of his own day, may be inferred unequivocally from his epitaph, even if we make some little allowance for the *De mortuis nil nisi bene* principle. This runs as follows: "Here lies Philippus Paracelsus, the famous Doctor Medicinæ, who, by his wonderful art, cured bad wounds, lepra, gout, dropsy and other incurable diseases, and to his own honor divided his possessions among the poor". What this epitaph extols conceals his more enduring services — the simplification and improvement of the treatment of the sick, a subject in which he could follow to the best advantage his empirical genius. His humanity and charity, virtues of the genuine physician, were famous. He himself, however, said that the physician must seek the kingdom of God among the Samaritans. He was an eminent observer, extremely prompt in comprehending what he saw, a deep thinker, for whom has been accomplished in our century that which he, in his prescience, held up to his enemies of that day: "Truly I shall accomplish more against you after my death, than before!" We are compelled to do justice even to the correctness of his modes of expression and of writing, and in the history of literature to count him as the earliest architect of our language, which he handled in so masterly a manner.

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[1] Even Goethe in his "Italian Travels" cries out "How little trace survives of any existence!"

By the very fact, however, that he wrote in German, Theophrastus von Hohenheim resigned, from the outset, a great part of the assurance of immediate results and of the halo of the learned. For the German tongue seemed, even to the German emperor, one suitable only to address horses, and the learned paid very little attention to its cultivation, a condition which continued down into the 18th century, and, so far as regards its higher cultivation, down even to our own time. Thus the influence of Theophrastus was limited mostly to Germans, and again more to the unlearned than the learned. Moreover it cannot be denied that many of his ideas are unintelligible or obscure, in consequence of his alchemistic, astrological and unfamiliar statement of them, and of their disagreeable embellishment. In the quiet times of the present day, the prominent self-assertion of Theophrastus (founded in a sense of his destiny and duty as a reformer) and his fancy, which often overshot the mark, excite little sympathy. Their boastful manifestation may have often been aroused by his antagonists as well as his admirers.

> "Follow me, not I you, follow ye me, follow me Avicenna, Galen, Rhazes, Montagnana, Mesuë, and ye others! Follow me, not I you! ye of Paris, Montpellier, ye of Suabia, ye of Meissen, ye of Cologne, ye of Vienna and the banks of the Danube and the Rhine, ye islands of the sea, Italy, Dalmatia, Sarmatia, Athens, ye Greeks, ye Arabs, ye Israelites, not one of you shall remain in the remotest corner upon whom the dogs shall not void their urine! I shall be the monarch, and mine the monarchy! How does this please you, Cacophrastus? This dung must ye eat! And ye Calefactores, ye shall become chimney-sweeps! What will you think when the sect of Theophrastus triumphs?" (S. Gründer).

Theophrastus was (at that time a rare circumstance) both a physician and a surgeon: still more he reformed both branches. When we consider the fashion of this branch of education in his day, the views of Paracelsus in the department of surgery (which he wished to have considered a branch of general medicine, without a knowledge of which a profitable pursuit of the former was not to be thought of) are very clear, and, for the time, even phenomenal. He ascribes high value to "local" anatomy in surgery, though he denies its importance in medicine. The operative side of surgery, however, was not in his line. Lithotomy alone he permitted, but otherwise prohibited entirely all cutting, burning and stitching by the "Folterhansen" (torturing idiots), as he called them. On the other hand his principles for the treatment of wounds, derived at all events from a rich experience in military surgery, are those of a master. How strongly reformatory his teachings were considered, may be inferred from the fact that, as Würtz (the great pupil of Theophrastus, whose doctrines, doings and thoughts constitute a constant panegyric upon his master) relates, in many localities the surgeons were compelled to take an oath not to follow the teachings of Theophrastus. And Hytell too exclaims: "They deprecate the use of the Holy Bible among Christians: why should the devils not poison Theophrastus also? But this proceeds from the haughty devil, that the truth may not come forth. The "Chirurgia Magna" of Theophrastus is collected from nature." These incorporated sciolists (Podexgelehrten) have always persecuted talent which towered above them!

The *vis medicatrix naturæ* he installed in its undiminished rights, and held that it accomplished the union of divided parts by means of a "natural balsam or animal mummy", separated from the body within wounds. To protect the latter is the task of the physician: "Every surgeon should understand that it is not he who heals, but the balsam within the body is that which heals, and that wherein thou art a good surgeon, is that thou offerest to nature defence and protection in the wounded part." For the production of this balsam the body supplies the material, but, on the other hand, it can be fostered or increased by drugs applied externally. The latter object is served by bandages impregnated with balsam etc. Theophrastus held very strongly to the cleanliness of wounds, almost too strongly it would seem, in direct opposition to the custom of that day: "I have often seen the ignorance of you surgeons, while the wounds fairly stunk and poured forth a foul pus, like a stinking old hole in elephantiasis (stinckend altes Loch am ölschenkel?), which suited you!" He recommended further spare diet and regulation of the drink, and was sufficiently acquainted too with the accidental complications of wounds, such as diphtheritis of wounds with simultaneous diphtheritis of the throat, surgical fever, traumatic tetanus, erysipelas etc.[1] In fractures he opposed the barbarous efforts and methods for the reduction of the broken bone, and laid stress upon the fact that nature could accomplish repair in these injuries also, without any aid. In other places, however, he recommended bandaging the fractures twice a day.

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[1] The enigmatical "Gliedwasser" of the German surgeons (mentioned as early as the time of Pfolspeundt) he refers to bad ointments employed in the dressings.

His views on the origin and nature of ulcers are less clear. Their treatment consisted mostly in the use of mineral remedies, though he also recommended the compressing bandage. For fractures of the leg he brought forward a special apparatus. In syphilis, the division of the disease into local and general, primary and secondary, as well as information relative to its inheritance, its manifold forms, and its influence upon the course of other diseases (Proksch), form the most important service of Theophrastus von Hohenheim. He administers mercury internally ("This poison, as you call it, has a far different and a better effect than the wagon-grease with which in the treatment of the French disease you are so fond of smearing your patients, worse than a cobbler greases his leather"), and he rejects all other measures, particularly inunction with mercurial ointment, fumigation, baths and decoctions of various woods, and sweating, for he says "If sweating will expel the French disease, a warm oven or a warm skin and the dog-days would be good for it." He employed internally a great number of mercurial preparations, prepared after alchemistic formulæ, and discarded the popular abuse of regimen during the treatment. He also erroneously regarded gonorrhœa as an initial stage of syphilis, but was correct in ascribing its causation to coitus (Proksch). He is no stranger even to hospital hygiene.

The medical doctrines of Theophrastus are intimately united with his theosophy, cosmogony, physiology and philosophy, which latter science was most nearly allied to Neo-Platonism. Thus he considers all existence as an emanation from God, which transformed itself first into the primitive force, the "Yliaster", whence again the "Mysterium magnum", the "Limbus major" or "Yliades" is descended.

From the latter proceeds the "Limbus minor", or the L. major flows into this. This is the last creature, the "original man" ("Urmensch"), from whom all spirits emanate. From the knowledge of God, of whom Theophrastus has a pantheistic conception, and from communion with God (without which the physician can be nothing) spring all enlightenment, all wisdom (scientia), in which latter term are included also the Cabala and magic.

Besides this the physician must also possess experience (experientia), which consists in the knowledge of the great world (excluding mankind), the macrocosmus, and of the lesser world (mankind), the microcosmus, which two stand always in intimate interchanging relations and influences, are one and the same, but not dependent upon each other, although each is inconceivable without the other. Hence Theophrastus also designates the macrocosmus as "outward man" (äusseren Menschen).

In the Mysterium magnum were contained the alchemistic elementary bodies, salt, sulphur and mercury, which Theophrastus and Basil Valentine, on the one hand, regard as components of all metals, and Theophrastus himself considers components of everything organic also. He was the discoverer of the metal zinc.

Out of that Mysterium flowed, and from various combinations of the three bodies above mentioned originated, the four common elements: air, water, earth, as representatives of the earthy, fire, as the celestial element. Each of these has an archæus or active principle, which, in contrast to dead matter, possesses a creative, formative power of its own. From the union of the elements originating within that triad, and arising organically, all material objects and all beings take their origin.

The predominating element in each of these is its quintessence — a term derived from Aristotle.

Theophrastus, in his usual metaphorical style, calls the elements the "mother" of things, and declares that the latter originate by way of development. All organisms arise from the active elements and the original mud (Urschleim, limus terræ), i. e. from its decomposition (putrefaction), and from water with the aid of heat.

That this attempt to explain the origin and existence of objects is also obscure, may depend upon the inscrutableness of the subject, which has occasioned the wreck of so many philosophical systems (and will cause the wreck of so many others) from the earliest Gnosticism down to Darwinism, of late so highly esteemed. Indeed Theophrastus himself was close upon the track of the latter system.

With his introduction of "salt, sulphur and mercury" Theophrastus came into rude conflict with the elementary matters and qualities of Galen. The former too, in his view, do not actually exist, but are merely immaterial agencies, or symbolical designations for these agencies — a symbolism of which Theophrastus, like the alchemists, furnishes many instances in other places also. Sulphur represents the combustible, salt the soluble, mercury the volatile element in things. During life they are one and inseparable, and it is not until death that their previous combination, under the influence of the vital force, ceases.

Magic and Cabalism are likewise component parts of his philosophy. All magic proceeds from the will, which, according to circumstances, produces good or evil. In this matter he goes hand in hand with the alchemists, though, on the other hand, he does not admit that "the things which the common people believe to be magical, witchlike and devilish, are really so, since they are natural and contrived on natural principles". Concerning these he says further: "Ere the world perishes, many arts now ascribed to the work of the devil will become public, and we shall then see that the most of these effects depend upon natural forces" — an inconsistency often observed in Theophrastus, and indeed, in Galen likewise, though the latter, as a Greek, was and is pardoned more readily than Theophrastus.

Theophrastus held what he designated philosophy to be an indispensable requisite for the physician, for "if a physician comes not into medicine well instructed in philosophy, he must struggle up to daylight in it." In this respect he greatly resembles Hippocrates, who said: "A philosophic physician is a godlike man."

Besides the doctrines contained in his philosophy and in his so-called astronomy (according to Theophrastus the comparison and consideration of the macrocosmus and microcosmus), alchemy and virtus form the basis of medicine, the former understood as the knowledge of the chemical preparation of drugs, and the latter as professional capacity and probity. In the sincere love of Theophrastus for his profession, the latter must necessarily appear to him as one of the four chief requisites of the art of medicine. "The physician must be no masker (Larvenmann), no old woman, no hangman, no liar, no trifler, but a genuine man." In this he was undoubtedly right: for without morality in its fullest sense a good physician is inconceivable!

The principle of activity in inanimate and animate objects was for Theophrastus something personal and spiritual (archæus, astrum, spiritus), an emanation from the Deity, and each element had, as we have seen, its own active and living agent. Thus in the air he found the Lemures (spirits of air, sylvans); in the earth, gnomes and pigmies; in the water, nymphs or water-sprites, and in the fire, the salamander.

The physiology of Theophrastus recognizes as the proper active and life-giving agent in man also his "archæus", whose home is in the stomach, who separates the material useful for nutrition, the "essence", from the useless, the "poison", and becomes thus the "alchemist of the body." Moreover he is the spirit of life, the "astral body." The "poison" is excreted by two routes — all excrements are therefore "poisons" — the "essence" remains in the body. It nourishes and maintains the latter, while each part and each member (since all possess their own special archæus, alchemist or stomach) attracts, extracts and assimilates what is appropriate for it. Digestion is a kind of putrefaction, by which, on the one hand, the assimilation of the nutritive slime, on the other, the formation of the excrement, is rendered possible. Health is recognized by the regular action of this archæus. It presides also over generation. The semen is a secretion from the *liquor vitae*, from the general fluids of the body, which secretion is effected by the exciting influence of the woman upon the fancy of the man, and takes place only momentarily during coitus. It is the quintessence of the fluids, which, being derived from each member, is therefore in condition to reproduce each member. Monsters originate in a defect, or multiple presence, of the semen out of a certain part of the body. The woman supplies no semen, but she, and especially her uterus, is merely the soil into which the male semen flows and is deposited, in order to be nourished and ripened. The nutrition of the embryo takes place by means of the breast-milk, which in some unknown way reaches the uterus. The latter organ attracts the semen as the magnet attracts iron. If this attraction takes place more than once, multiple pregnancies arise. In these cases the woman's fancy also takes part. By it that of the man is supplemented. Man and woman, however, supply in generation only the body and soul, while the spirit is furnished during the process by God alone. "That which forms man is the spirit of the Lord in its place." Hence men are godlike and immortal. He distinguishes two kinds of semen, the true, generated by fancy in the astral body — the yliastric semen — and that secreted from the ordinary body — the cagastric — (probably the aura seminalis and the semen without this). The cagastric is a mere excrement; the yliastric alone serves for reproduction, and is the effective agent in coition and generation.

A striking similarity with the doctrines of Darwin is found in the view of Theophrastus, that the origin of everything is simply the transformation of germs always existing (and therefore is a metamorphosis), as well as in the fact that he maintained that every object and being originated at the expense of, and through the destruction of, another — a doctrine in which we see already developed the war of individual against individual, and the struggle for existence, so much talked about now-a-days.

Upon anatomy in our sense of the term — he calls it local anatomy — Theophrastus, as we have said, laid no weight, so far as concerns internal diseases. He opposes to it a universal anatomy, which the physician must know in order to cure and to understand diseases. Under this universal anatomy he understands the separation into that triad of fundamental bodies — salt, sulphur, mercury, of which the body consists — as well as the knowledge of the nature and power of an object and of its celestial model. The parts of the body stand in reciprocal relation with the stars, and in fact the seven great organs, the brain, heart, lungs, gall, kidneys and spleen, correspond to the moon, the sun, Mercury, Mars, Jupiter, Venus and Saturn.

The ætiology of Theophrastus distinguishes five causes of disease: 1. The Ens astrale (a certain power of the stars), i. e. the influence of the stars by means of foul air etc.; 2. The Ens veneni (power of poison), the troubles which spring from assimilation or digestion; 3. Ens naturale (power of nature or of the body), the maladies which originate from the body itself (diatheses); 4. Ens spirituale (power of the spirit), the infirmities which come from the spiritual sphere, e. g. perverted ideas; 5. Ens Dei (power of God), the injuries or causes of disease predetermined by God. "We say also that our body is subjected to five Entibus, and each Ens has under it all diseases, and with them power over our body. Thus there are five kinds of dropsy, five kinds of jaundice, five kinds of fever, five kinds of cancer, and the same of other diseases." In this Theophrastus again squarely controverts the Arabians and Galenists. "But ye also hold, and erroneously lay down in opposition to us, the law that all pestilence springs from the humors, or out of that which is in the body." Moreover he affirms the existence of a "Seed of disease", in fact two forms of it, an hereditary ("yliastric"), and one originating from corruption ("cagastric").

In a similar way he sets himself in opposition to Galen in regard to the general pathological conceptions of health and disease. The former, according to Theophrastus, consists in the due proportion of "sulphur, salt and mercury" in the body, together with the correct action of the archæus:

disease is the opposite of this. "Therefore the physician should know that all diseases lie in these three substances, and not in the four elements." The so-called fundamental humors are, therefore, only results and expressions of disease. The latter itself, in accordance with the laws the of body, is a phenomenon conditioned by nature, the introduction to its destruction, or to death. Diseases also, in their quality as integral parts of the microcosm, like microcosm in microcosm, have their models in the macrocosm. Thus epilepsy resembles the earthquake, apoplexy the lightning, flatulence the wind-storm ; dropsy, inundations ; the chilliness of fever, the quaking at the origin of new worlds. Fever in itself, according to his views, is an effort of the healing power of nature to equalize the disturbances of the body, i. e. to cure. Theophrastus divided diseases into material and spiritual, acute and chronic.

In special pathology Theophrastus differs entirely from the established doctrines, inasmuch as he does not separate and name the special forms of disease, but brings them under certain classes, named after his fundamental elements and the products of their chemical transformation, as well as after their remedies, a plan equally adapted to overthrow the ancient medicine, which named them after the humors. External diseases are, in his view, diseases of the elements salt and mercury : most fevers and internal diseases are diseases of the sulphur. He bases his classification upon their remedies, a system in which Rademacher was his descendant. "A natural, genuine physician says this is a morbus helleborinus or turpentinus, not that it is phlegma, chorryza or catarrhus."

Thus he formed also the great class of "Tartaric Diseases" (so named because they burn like hell, and form deposits of matter, as wine deposits tartar), which embrace those diseases that deposit solid products of morbid character, or which render the tissues rigid. The mildest form of the "Tartarus" is the so-called dental tartar. In other cases it has a special predilection for the joints (gout-stones), and forms also (by a disappearance of its mucous portion and the deposit of earthy matter) calculi of the bladder, kidneys, gall-bladder, lungs and intestines etc. It is transmissible in procreation, so long as it has not been manifestly deposited by the individual concerned. In other cases it is no longer hereditary. The diseases of the Tartarus are e. g. ischias, lumbago, sciatica, gout (of the intestines and stomach, podagra, chiragra etc.) and diseases of the liver. The "Tartarus" arises from errors of assimilation, when the "poison" of the food is not excreted but remains in the body : it is also retained excrement. The paroxysms of the disease in question are nothing but occasional efforts of the body to remove the poison. On hydrophobia also Theophrastus expresses peculiar views. The diseases of women he considers actually different from those of men (e. g. hysteria and hypochondria), since, like Goethe, he always ascribes the chief rôle within women, and in the origin of their diseases, to one point, the uterus (the microcosmus in the microcosma) and its appendages.

In regard to Semeiology, Theophrastus insists that it must be based not upon the symptoms of diseases, but upon a knowledge of their various connexion with the microcosmus — he regards disease, as we know, as a microcosmus in a microcosmus, a human being within a human being. Their physiognomy, like that of a man, should be looked upon as a distinctive mark. Each organ, as we have seen before in his universal anatomy, is dependent upon the stars. His conception of the pulse is similar thereto. It reveals to him those relations and the temperature of the body. He makes seven kinds of pulse, as there are seven planets. The pulse of the sun lies beneath the heart; two pulses in the neck belong to Venus and Mars; two in the feet to Jupiter and Saturn; those of the temples to the moon and to Mercury. The physician must know the planets of the microcosmus, the meridian line etc., before he can determine the vital actions of the body and can cure diseases. Intermission of the pulse corresponds to the eclipse, and a host of similar foolish, absurd and unintelligible fancies, consonant however to the age, and held to be perfectly comprehensible! Theophrastus, ingenious as he is, though prone to the faults of his day, discards the uroscopy customary in his time — he calls it bluntly "Seichbesehen"— but replaces it by speculations equally untenable. Thus he refers the form of sediment which he names "Alcola" to the stomach, the "Hypostasis", to the liver etc., and, in accordance with his views of the "Tartarus", sees the latter in urinary deposits. "He who cannot distinguish the Tartarus, looks into the piss like a calf out of a gate!" In the foregoing statements, which to-day are as unsatisfactory as many a demonstration in the "exact" style of the present day will be to subsequent generations, Theophrastus remains the true son of his time! He made no account of the signs observed in the blood drawn from the veins, which often had a healthy appearance even in the plague, and, on the other hand, lays stress upon the chemical examination of the urine, in order to acquire a knowledge of the Tartarus.

Theophrastus admits that he was led to his reformatory ideas by the bad results of the ancient practice. "Since I saw that the doctrine accomplished nothing but the making of corpses, deaths, murder, deformity, cripples, and decay, and had no foundation, I was compelled to pursue the truth in another way, to seek another basis, which I have attained after hard labor."

The aim of Theophrastus, therefore, was so strongly directed to practice; in other words his recognition of the first and last duty of medicine — that of healing — was in him so overpowering and controlling, that he even said: "If God will not help, so help me the devil!" — a remark in which undoubtedly the existence of a so-called purely "rational" system of therapeutics (which, however, in spite of all pretensions, has never existed) was from the outset denied. And thus Theophrastus in his therapeutics also produced a successful and lasting reformation. In this he greatly resembled Hippocrates, with whom also he shared a high regard for the "internal physician", the healing power of nature, a power which led the struggle of the sound parts against disease. The latter, Theophrastus, indeed, ever regarded as a hostile being, to be fought with all his power. "If a disease is in the body all the sound organs must fight against it; not one, but all. Nature notes this fact." "Nature is the physician, not you!" If she refuses, then first begins the office of the physician, the "external physician", who has the "archæus" to support, that this "internal" physician may gain the victory. Then begins the art of healing, upon which Theophrastus lays equal weight, since he assumes that a remedy exists for every disease. He considers no disease incurable. "If thou lovest thy neighbor thou must not say there is nothing which can help thee: but thou must say I cannot help thee, and I do not know anything to help thee!" One should be willing to cure not only with opposing remedies, like the Ancients, but also with similar remedies, not only ***contraria contrariis***, but also ***similia similibus***, a maxim upon which Hahnemann subsequently seized, as did Rademacher upon his system of nomenclature of diseases. Among the various remedies too the physician must know above all their relations to celestial things, and then to the organs, since the stars impress their "signature" upon all drugs. This is recognized by the form, color etc., as a woman is by her breasts. Therefore the testiculate orchis-root indicates its use in diseases of the testicle; the black spot on the flower of the euphrasia points to the pupil of the eye; the color of the lizard, to unhealthy ulcers; gold, which, according to the cabalistic assumption, harmonizes with the heart, indicates its employment in diseases of the heart etc. Therefore these remedies cure diseases of the organs indicated. The best remedies for any special disease are always found in the place where that disease prevails: hence indigenous remedies are in general the best: "For where there is a new disease, there is also its remedy."[1] The special duty of the physician consists, according to Theophrastus, in finding for each disease its special remedy, the specificum and arcanum. Under the last title he understands the active, immaterial principle of the specifics, the quintessence of the remedy. "All arcana are so conditioned that they accomplish their work without matter and bodies." From this grew two further peculiarities of his therapeutics: the essences, tinctures and extracts, in which he exhibited simple drugs, with the idea of thus coming nearer to the arcanum; and the so-called elixir of life, or universal remedy, which Theophrastus professed to have discovered in his Laudanum (perhaps our tincture of opium). Hence too proceeded the stress which he laid upon ***simple recipes***, in contrast with the half a hundred drugs of the Galenistic potions — simple, indeed, in the ideas of that day, though the very simplicia of Theophrastus would appear to us now extremely complex prescriptions. In combating the method of treatment directed against the four cardinal humors — the so-called canonical treatment — and compound remedies, Theophrastus gives free rein to his humor and satire. "In making recipes a single prescription often contains 40–50 simplicia. It cannot well be denied too that your disciples will, without hesitation, put 300 or 1000 simplicia in one recipe . . . . Now, if the addition and then the much vaunted multiplication upon the humors had been employed in the body of man, then the whole world should have erected a coffer, in order to build a church and ordain and place therein monks to sing the requiem of multiplication in prescription writing, and a Te Deum laudamus to multiplication of the humors. Then I too would become a monk therein, and expiate my sins also in the multiplication of the humors. And I wish to God it might be done to-day." "Which trowsers are the best? the whole or the patched? What man is so silly as to think that nature has divided up her virtue, so much in the cabbage, so much in something else, and then orders you doctors to compound them! Bah! This miserable compounding business! Yet the woman requires only one man to father her child; many seeds only corrupt it. Mix many kinds of seed and bray them like an apothecary and bury them in the earth: no fruit will come from them."

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[1] This was a teleological view. Or perhaps it may be considered (as with Hutten) the expression of considerations of political economy, and designed to prevent the outflow of German money for foreign products — a subject at that period much discussed.

Theophrastus did not ascribe much importance to dietetic measures, especially in chronic diseases. "He who treats disease by diet is weak in the art of medicine, and forgets that diet ends in dung."

As regards particular remedies the fact should be emphasized that Theophrastus first introduced into therapeutics many mineral remedies and chemical preparations as such (including mineral baths, iron, sulphur, antimony, gold, tin, lead etc.), and thus claimed for the strongest poisons always the capacity to be used as remedies. In this too, as in his so-called specifica, he gave the greatest aid to an abuse which crept in in succeeding times. He thought — far in advance of his time — that chemistry was designed not for making gold, but for the preparation of medicines. Still he also made use of vegetable remedies, such as arnica, opium, hellebore etc., though he fulminated his hatred against guaiac, which he compares to oak wood. In opposition to the Arabians and Galen he chooses, however, chemical and mineral substances as purgatives. He is cautious in the use of venesection, though the operation was then held in great esteem, but recommends it chiefly at the time when a "sign" not related to the disease prevails, though he discards the astrological calendar. That Theophrastus, in contradiction to his numerous and better reformatory ideas, employed also the precious stones, preparations of mummies and other corpses, cabalistic words, the magnet (he was acquainted with its polarity), talismans etc., should not, in consideration of the dense superstition which controlled even the better minds of the age, be made an absolute reproach against him, since in good as well as evil he was certainly a genuine son of his century and of his nation. For this reason he has become an historical and representative personage. His later critics called him an ass (like Zimmermann), or the greatest of Swiss physicians (like Hans Locher), according to their special consideration of his good or bad peculiarities. Where there is much light, there too are heavy shadows! Yet posterity soon forgets inconsiderable men, which has not been the case with Theophrastus von Hohenheim.

The writings of Theophrastus, as he himself complains, were often corrupted by his copyists, and the writings of others even were foisted upon him. A complete edition of them, including also some of the spurious, appeared in Basle in 1589 (10 parts folio), and in Strassburg 1616–18 (published in three folio volumes by Joh. Huser). Among the 84 treatises contained in these the following, among others, are regarded as "genuine": "Die grosse und kleine Chirurgie"; "Paramirum"; "Paragranum"; "De morbis ex tartaro oriundis"; "Von des Bads Pfeffers etc."; "Büchlein von der Pestillentz"; "Drei Bucher von den Franzosen"; "Von den Imposturen der Aerzte" (Marx).

That so quarrelsome and provoking a man as Theophrastus should find and arouse both followers and opponents is readily understood, as well as the fact that both parties should fall into exaggerations and go to extremes. It is also not an uncommon experience that his pupils chiefly elaborated only the superstitious, mystic, incomprehensible side of his doctrines, in fact pursued them into absurdity and deception. Still less is it surprising that his opponents made use of this side for their point of attack, although they themselves adhered to superstition of a different, but quite as bad a type. It is remarkable rather that his theoretical views, in so many and such weighty respects opposed to those which had hitherto prevailed, should have aroused so little, comparatively, the more important spirits — the subordinates interested themselves quite enough — of his time.

Ill-fortune, or rather the often unfortunate tenor of the doctrines of Theophrastus, led pure laymen to educate themselves up to "physicians" *à la* Paracelsus, and the same fate befell his silly descendant Hahnemann, though with more justice to the latter than to that profound and ingenious reformer, whom Shakespeare, in his "All's well that ends well", calls the greatest physician after Galen, and of whom Ranke says: "In him there lived a spirit ingenious, profound and endowed with rare knowledge, which from the single point which he grasped intended to vanquish the world: reaching out far too widely, self-sufficient, arrogant and fantastic; such a spirit as often presents itself still in the German nation." It is, however, characteristic that the central point of his reform, his transformation of practice, was precisely that which procured him followers (and right zealous ones too) even among the learned of his own, and the following age. That the partisans pro and contra belonged — at least two-thirds of them — to the German nation is explained by the fact that the German was at that time a language unintelligible to, and therefore despised by, all foreigners, as has been the case down even to the present day. His really great ideas too lay buried in fustian, "bombast", and alchemistic and astrological nonsense and frippery, so that bringing them to light at a later period was in many respects like working a difficult mine, a work which only a savant like Marx could accomplish satisfactorily and finally. But the germ of his doctrine, thus extracted from the works of Theophrastus, speaks more loudly for his greatness — he was even free from the belief in demoniacal possession — than could any palliation of his weaknesses and any enthusiastic laudation! Theophrastus must be understood and criticised in and from his own time, and not measured by the rule of the present day. He must be judged in accordance with his influence upon his own day and upon succeeding ages.

The followers of Theophrastus, who clung chiefly to his alchemistic, cabalistic, theosophic and similar doctrines, by which only he was criticised far into the future, were also called Spagyrists (Rosicrucians); those, however. who followed him in his better views, and were not unconditional "Paracelsists", but partly Galenists, were named "Syncretists", "Conciliators", terms also employed at another period to designate the middle party.

Among the followers of Paracelsus many were bold adventurers and impostors, others fools and ignoramuses, and some were both. In the latter class must be reckoned, before all others,

LEONHARD THURNEYSSER of Thurn (1530–1595),

son of a goldsmith of Basle, who followed his father's business (and collected herbs for Dr. Huber, a physician of that day, at whose instance he also read the writings of Theophrastus) until he coated tin with gold and sold it for pure gold, a piece of fraud which in 1548 necessitated the flight of this precocious scamp to England. Thence, however, he soon went into the military service of Brandenburg, then became a smelter, then again a goldsmith in Strassburg (1555), from which place he came to Tyrol as inspector of mines. In addition he mined upon his own account with such success, and consequently with such credit, that he was sent out as travelling inspector with a salary from the archduke. In this way he went in 1560 to Scotland, a year later to Spain, then to Africa, Asia Minor and Arabia, where on Mount Sinai he joined the order of St. Catharine. In 1568 he returned to Austro-Hungary and practised medicine with such success, that (as often happens to-day) he regarded himself as a great physician, and was also as such very "famous". In order to bring out his books on medicine in the best style he went to Frankfort-on-the-Oder, a famous publishing place at that time, and at the same time made himself so useful to the elector Johann Georg in his sickness, that he was appointed his ordinary physician with a considerable salary. Next he came to Berlin, where he sold rouge and tincture of gold to the court dames who needed them, Magisterium Solis to fools, constructed horoscopes, went into the business of a usurer and pawnbroker, published astrological almanacs etc., by which devices he acquired wealth, built himself a private laboratory, a private printing-office and type-foundry (in both of which he introduced improvements), and employed in his works more than 200 men. He also established in Berlin its first botanical and zoological garden, as well as the first cabinet of natural curiosities. All at once

CASPAR HOFMANN, professor at Frankfort-on-the-Oder,

published a book entitled "De barbarie imminente", which deprived Thurneysser of much of his reputation. A lawsuit now cost him most of his ill-acquired wealth, and he therefore went to Italy. Finally he became very poor, and died in a cloister at Cologne — in his life, career and fate a model of the alchemist and miracle-working doctor of his day! The titles of the works (some illustrated with wood-cuts) of this clever swindler, who had read a few scraps of Greek and stolen a little Latin, are characteristic of their contents: "Quinta essentia, das ist die höchste Subtilitet, Krafft und Wirckung beider der fürtrefflichsten Künsten der Medicina und Alchemia";

"Pison"; "*Βεβαίωσις ἀγωνισμοῦ*, i. e. confirmation of uroscopy." Of similar worth was

ADAM VON BODENSTEIN (died 1576),

a son of the famous theologian Karlstadt (the Lassalle of the socialistic and communistic peasant-revolution of that time), but a practising physician in Basle. He wrote an "Onomastikon" to the writings of Theophrastus von Hohenheim, a work subsequently republished by

MICHAEL TOXITES and

VALENTIN ANTAPRASSUS SILORANUS.

MARTIN RULAND (1532–1602) of Lauingen in Swabia,

following the crudest observation, compiled a catalogue of remedies and diseases in which they were of service. He was the father of a physician of the same name who disputed with Joh. Ingolstetter, a physician of Nuremberg, concerning the theory of the "golden tooth". He was also the inventor of the "aqua benedicta" (vinum stibiatum).

GEORG PHÄDRO VON RODACH (1562),

physician to the archbishop of Salzburg.

BARTHOLOMÆUS CARRICHTER (about 1570) of Reckingen,

ordinary physician of the emperor Maximilian II. (1527–1576, his post mortem revealed three "heart-stones"), recommended e. g. as an arcanum against luxations bandaging the joint with the tendo Achillis of an elk.

GERHARD DORN (about 1580) of Frankfort-on-the-Main,

like Paracelsus, was a partisan of the Cabala, alchemy etc.

MICHAEL BAPST (died 1603) of Rochlitz,

a minister and proprietor of a boarding-school for boys, wrote a "Giftjagendes Kunst- und Hausbuch" (1592) and other similar works. while

GEORG AMWALD,

the itinerant lawyer and drug-peddler (he left Augsburg in 1583, and died at the beginning of the seventeenth century), at the same period sold a panacea which consisted of egg-shells, saffron and cinnabar, and introduced in his writings bulky testimonials of persons who had been saved thereby — a genuine Barry du Barry of the 16th century!

Among the theosophistical, mystical and cabalistic followers of Paracelsus belong the Rosicrucians, a secret society, which, curiously enough, owes its formal existence to the satirical and humorous writings (among these the "Chymische Hochzeit Christian's Rosenkreuz") of the minister Valentin Andreæ (1586–1654) of Calw in Wurtemberg, composed for the express purpose of combating the nonsense of the alchemists. An informal secret association, however, had existed before this, whose members were to pursue openly no other occupation than the gratuitous, but only mystic, treatment of the sick, in return for which, however, they were to receive the philosopher's stone.[1]

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1. According to Sprengel the earliest historical trace of the Rosicrucians appears in 1610, when a notary Haselmayer is said to have read in MS. the "Fama fraternitatis" or constitution of their order. In 1614 appeared at Regensburg a work entitled "Allgemeine und General Reformation der ganzen Welt, benebst der Fama fraternitatis der Rosenkreuzer". In the "Fama" it is related that a German, Christian Rosenkreuz, had founded the society in the 14th century, after

For the sake of preserving the connection they are enumerated here, though the most important of them (Fludd) belonged to the following century, during which they displayed their greatest activity and monopolized most of the treatment of the sick. We mention the rediscoverer of ether.

OSWALD CROLL, a Hessian (1560–1609),

whose "Basilica chymica" survived twenty editions, and who, like

JULIUS SPERBER,

was ordinary physician of Anhalt. Croll was also the first to furnish a formula for the preparation of calomel.

HENNING SCHEUNEMANN,

a physician in Bamberg and Aschersleben;

HEINRICH KUNRATH (1560–1605), a physician of Hamburg;

JOHANN GRAMANN (about 1593), a minister;

VALENTIN WEIGEL (1533 until after 1594), a minister near Chemnitz;

ÆGIDIUS GUTTMANN (about 1575), a minister in Swabia, and finally

LEVINUS BATTUS (died 1591 in Rostock),

who declared the herb fleabane, washed in the river and hung upon the seat of disease (e. g. the nipples, the ears, penis etc. — compare the Talmudists) and then buried to be a sovereign remedy against all evil spirits and diseases. Gramann administers the oil of nutmeg in injuries of the brain, weak memory etc. (because it has the "signature" of the brain), as well as in hiccups, vapors, female leucorrhœa, foul breath and stone in the bladder. Finally, according to the same authority, the same remedy rubbed in about the navel will help the frigid husband into the saddle, and warm up the swollen, cold uterus to become fruitful, if rubbed in in that neighborhood!

CASPAR PEUCER (1525–1602)

was likewise counted among the Paracelsists.

In England the Pseudo-Paracelsists included:

JOHN MICHELL[1] (about 1585), the surgeon **JOHN HOSTER**,[2] and the most famous of the Rosicrucians,

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having learned in Egypt and Fez the sublime wisdom of the Orient. Rosenkreuz imparted his mysteries to three disciples, who established the following laws for the society: 1. The members of the society should openly practice no other than the medical profession, and treat all the sick gratuitously. 2. They should wear the dress of the country in which they resided. 3. They should assemble each year, on the anniversary of the birthday of their founder, at the chapel of the Holy Spirit, a secret rendezvous. 4. They should initiate suitable laymen to inherit their mysteries. 5. They should choose the word "Rosenkreuz" for a watchword. 6. They should conceal the existence of the society for a hundred years. All members of the society were assured of complete celestial knowledge, unspeakable riches, exemption from all diseases, eternal youth, and the philosophers' stone to boot. Andreæ is said to have written the "chymische Hochzeit" as early as 1603. (H.)

[1] Sprengel calls him Johann Michelius, and says he came from Antwerp to London, where he deceived everyone with his philosophers' stone and universal medicine. He also wrote an "Apologia", in which he shamefully abused the ancient physicians and lauded Paracelsus to the skies.

[2] Haller calls him Hester, and ascribes to him a "Compendium secretorum rationalium" and a treatise on practice entitled "Pearle of practice, or pearle for physik and chirurgerie", London, 1592. (H.)

Robert Fludd[1] (1574–1637),
who declared: "He who will be sound must have pleasure in the law of the Lord, and speak of it day and night." He likewise peopled the whole world with demons and spirits. One knows at once where he stands, and is filled with delight when he reads: "Therefore the faithful physician must lay hold of the armor of God, that he may be able to withstand; for he has not to struggle with flesh and blood."

In Denmark

Peter Severin (1540–1602) of Ribe in Jutland,
ordinary physician of the king, was an especially zealous partisan of Paracelsus, whom he follows in everything.

Olaus Borrichius (Ole Borch, died 1690) belonged to the same school.

In France the partisans of Paracelsus adhered particularly to his materia medica and surgery, and the treatise of Paracelsus upon the latter subject was translated into French by

Claude Dariot (1533–1594) of Pomar near Beaume.

Claude Aubery of Trécourt,
who in earlier life had been a wealthy alchemist, became subsequently very poor and died wretchedly in a hospital at the age of 98.

Bernard Georges Penot, Jacques Gohory (Leo Suavius, died 1576) and

Roch le Baillif de la Rivière,
ordinary physician of Henry IV. (1533–1610), are not so well known as

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[1] Called also De Fluctibus. He was born in Milgate, Kent, graduated at Oxford in 1605 and, after travelling for six years, finally settled in London, where he became a member of the College of Physicians. He was also a prominent member of the society of Rosicrucians and wrote a "Tractatus apologeticus" in its defence. His voluminous writings are full of unintelligible Rabbinical and alchemistic absurdities, which possibly accounts for his great reputation in his own day—omne ignotum pro magnifico. Perhaps his best known medical treatise is the "Medicina Catholica, seu Mysticum Artis medicandi Sacrarium". Another of these Pseudo-Paracelsists was Francis Anthony (1550–1623), an alumnus of Cambridge, who devoted himself zealously to the study of chemistry and published in 1598 a treatise "Panacea aurea, seu de auro potabili", in which he proclaims his discovery of an arcanum capable of curing all diseases. The College of Physicians, of which he was a member, compelled him to undergo an examination, which he stood so badly that he was interdicted from practice. But, far from daunted by this opposition, he continued to practice in spite of fines and imprisonment, until he fairly wore out the opposition of the College and finally regained his doctor's title. In 1610 he again published a treatise "Medicinæ chymicæ et veri auri potabilis assertio", and six years later appeared an "Apology in defence of his medicine stiled aurum potabile", in reply to an attack by Matthew Gwinne. Anthony had two sons, both of whom where physicians, and while one of them continued to make the most of his father's aurum potabile, the other became an eminent practitioner in Bedford.

William Butler (1534–1617), of the county Clare in Ireland, was also a famous alchemist, who was held in high esteem by king James I. and by Van Helmont himself. He was reputed to have discovered a stone by means of which he cured the most dangerous diseases, and an investigation of the subject by Sir Kenelm Digby convinced the investigator, at least, of the truth of the report. (H.)

Jos. du Chesne (Quercetanus, 1521–1609),

a nobleman of Gascony and also ordinary physician of Henry IV. The latter physician was the first in France to recommend the antimonial remedies of Paracelsus. These, however, were proscribed by Parliament in 1566, at the instance of that indefatigable champion of Antiquity and personification of contradiction,

Joh. Riolan (1538–1606),

whose example furnishes proof that even eternal opposition brings about a kind of immortality. This quarrel about antimony, i. e. the struggle between the ancient Galenic, and the new chemical, therapeutics. gave occasion to the famous Faculty of Paris in 1603 to place formally under the ban Théodore Turquet de Mayerne (1573–1655) and Pierre de la Poterie. "All physicians too, who practice medicine anywhere. are admonished to banish from themselves and their thresholds the said Turquet, and all similar monsters of mankind and monstrosities of opinion, and to remain true to Galen". The same fate befell in 1609 a physician Besnier, who was not received again into the Faculty until he had sworn to renounce the use of antimony. This interdiction was not removed until 1666. In Italy

Giov. Battista Zapata, Isabella Cortese, the impostor

Leonardo Fioravanti (about 1564) of Bologna,

who sought to establish the theory that syphilis originated from feeding animals upon the flesh of their own species, and

Tomasso Bovio (Thomas Bovius, about 1592),

who called himself Zefiriel after his guardian angel, whose name, singularly enough, he knew — were all zealous propagators of the arcana.

More conducive to the honor of Paracelsus were his semi-partisans, at the head of whom was

Winther (Günther) von Andernach,

who in his later days at least employed the remedies of Paracelsus, although he also recommended those of the ancient physicians. This learned physician, in accordance with the views of his age, also considered ordinary anatomy quite unessential in medicine. — The following physicians, though opponents of the theoretical side of the teachings of Paracelsus, were yet followers of his pharmacology:

Andreas Ellinger (died 1582), professor in Jena; Benedictus Aretius (about 1572); Theodor and Jacob Zwinger (1569–1610); Michael Döring (died 1644), one of the most famous of the old professors of Giessen; Heinrich Peträus, and Guillaume Arragos (1513–1610) of Toulouse, ordinary physician at Paris and subsequently at Vienna, who died in the house of his friend Jacob Zwinger at Basle.

The weightiest opponent of Theophrastus (and quite naturally his earlier colleague in the university of Basel) was

Thomas Erastus (in German Lieber, 1527–1583),

who was joined by his colleague in Heidelberg,

Heinrich Smet (Smetius, 1537–1614),

a native of Flanders. Paracelsus was also opposed by

Bernhard Dessenius (1510–1574) of Amsterdam, a physician in Gröningen and subsequently in Cologne; Andreas Libavius (1540–1616) of Halle, a physician in Coburg and an eminent chemist; the Altdorf professor Caspar Hofmann (1572–1648) and Angelus Sala, the successor of Libavius, who died in 1637. Sala was originally from Vicenza, but in 1625 was appointed ordinary physician in Mecklenburg. He recommended the internal employment of nitrate of silver.

In a more quiet way than that of the Paracelsists the dispute among the learned against Galen served also to introduce a new medicine. Besides Cardanus, who has been already mentioned, this dispute was carried on most zealously by

Giovanni Argenterio (1513–1572) of Castelnuovo in Piedmont. He practised without success, and consequently without acquiring confidence (after finishing his studies in Turin), first at Lyons, then in Antwerp, and was subsequently appointed a professor in Pisa, Naples, Rome and finally in Turin.

In opposition to Galen, who sought disease in an unnatural condition in which the "euexia" is wanting, disease, according to Argenterio, is an "ametria" in the composition of the parts. He did *not* find its causes in the elementary qualities, nor did he allow that the so-called secondary qualities were dependent upon these. In this he flew directly in the face of the Galenic system. Still bolder almost — at least at that period — was his refusal to accept the manifold varieties of pneuma. Moreover Argenterio denied the "special forces" etc. Medicine he held very properly as an experimental science, intermediate between art and science.

These doctrines awakened the violent opposition of the Galenist Alexander von Neustain (1506–1590), his opponent Rainer Solenander (1521–1596), ordinary physician of Cleves, George Bertini, and the Aristotelian Remigius Megliorati,

who wished to uphold the possibility of "putridity" in living bodies, and the theory that this was the cause of the so-called putrid fever — a doctrine, as we know, borrowed from the Pneumatists. The denial of this was the chief merit of Argenterio's pupil, and after him the most important of the Antigalenists,

Laurent Joubert (1529–1583) of Valence in Dauphinée, He was a professor, and afterwards the influential chancellor of the school of Montpellier, and his work entitled "Erreurs populaires au fait de la médecine et régime de santé" awakened such attention and found such approval, that 6000 copies of it were disposed of in six months, an astonishing success at a time when newspaper advertising was still in its infancy!

This, at that time very revolutionary, doctrine excited great attention, and awakened the opposition of Bruno Seidel, professor at Erfurt, and of Erastus. In opposition to the former of these Joubert maintained that a foul odor, even of the excrements, was no certain evidence of putridity, as many things had a foul odor without being either excrements or putrid. Moreover Joubert asserted that menstrual blood was not poisonous, rejected Galen's doctrine of forces etc. Simon Simonius, physician of the elector of Saxony, gave his aid to the side of the author of "Erreurs populaires" etc. and "Paradoxa medica".

Guillaume Rondelet (1507–1566), his pupil Hieronimo Capivaccio (died 1589), professor in Padua, and the truly Catholic and conscientious Andreas Dudith von Horekovicz (1533–1589),

privy-councillor of Ferdinand I. (1503–1564, who, though the son of the Spanish Philip, did not persecute Protestants), bishop of Tina in Dalmatia, deputy at the Council of Trent, ambassador to Poland etc., and a partisan of the Reformation, for which reason he also married.

Other subjects of reform were found in semeiology, which was first specially cultivated in the sixteenth century. Among these subjects were uroscopy or uromancy, the doctrine of the pulse and that of critical days.

The following physicians wrote on the subject of semeiology, which was revived upon Greek principles and bloomed anew in the 16th century. Uldaricus Binder (1506, Epiphania medicorum); Jacobus Sylvius (1539, De signis omnibus medicis); Joh. Jac. Huggel (1560, De semiotice medicinæ etc.); Jodocus Lommius (Observ. medicæ, 1560); Franc. Valerius (1565, De urinis, pulsibus ac febribus); Andreas Planer (1579, Theses de signis); Ludov. Lemmosius (1588, De optime prædicandi ratione); Jac. Hollerius 1576; Ludov. Duretus (Interpretationes in Hippocratis prænotiones, 1585); Giov. Argenterio; Thomas Mouffet;[1] Joh. Bapt. Donatus; Peter Foreest. Thom. Fyens; Emilio Campolongo (Semiotice, published by Joh. Jessen a Jessen, who was beheaded in 1621); Prosper Alpino (De præsagienda vita et morte ægrotantium) and others.

Uroscopy and uromancy, which even to-day are pursued secretly by a few in a purely "business" point of view, were in the 16th century still an open, recognized and honorable occupation of the physician, and an ordinary demand of practice. They were elaborated particularly by the Arabians, then imported into the West and based upon the Galenic doctrine that the condition of the natural forces can be determined from the condition of the urine, as that of the spiritual forces from the pulse; and that in the same way the health or disease of each important organ may be determined. In support of such nonsense, which was especially current in Germany, such men even as Joubert, Capivaccio, Thomas Fyens (1567–1631) at Louvain, and Hercules Sassonia (1550–1607) declared themselves. More numerous and weighty, however, were its opponents: Joh. Lange, Diomedes Cornarus, Horekovicz, Clementius Clementinus (about 1512) at Rome; Christopher Clauser (about 1531) of Zürich; Euricius Cordus (1486–1534) of Simmershausen in Hesse (lived about 1520 in Erfurt, then in Marburg, died 1534 in Bremen and introduced the term "Scharbock"). Franz Emerich (about 1552) of Vienna; Bruno Seidel (about 1562), professor in Erfurt; Wilhelm Adolf Scribonius (about 1585) in Marburg; Siegmund Koelreuter (about 1574) in Nuremberg, and Peter van Foreest (1522–1597) of Alkmaer in northern Holland. Such were the most famous of the opponents of this doctrine, who contended that the causes of disease and diseases themselves etc. could not be determined from the urine, since temperament, season, mode of life and age had a great influence upon its excretion.[2]

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[1] Mouffet was a physician and naturalist, and a member of the College of Physicians of London. He died about the close of the 16th century. His treatise on semeiology was entitled "Nosomantica Hippocratica, seu Hippocratis prognostica cuncta", Frankfort, 1588. Among other works by the same author is a treatise upon dietetics: "Health's improvement, or rules concerning the nature, method and manner of preparing all sorts of food". (H.)

[2] "Carry his water to the wise woman"

says Fabian in "Twelfth Night", and to the question of the doughty Sir John Falstaff in "King Henry IV.",

"Sirrah, you giant, what says the doctor to my water?"

his page replies:

"He said, sir, the water itself was a good healthy water: but for the party that owned it, he might have more diseases than he knew for."

On which the learned Steevens makes the following comment: "The method of investigating diseases by the inspection of urine only was once so much the

The axe was also laid at the root of the extremely subtile Galenic doctrine of the pulse, though very coyly at first, and only superficially. Thus the Polish ordinary physician Joseph Struthius (Strus, 1510-1568) studied the subject anew, but accepted five chief classes of the pulse, with 15 simple, and 17 compound varieties. Leo Rogani (about 1556) and Capivaccio varied from him very little. Horekoviez, Fyens, Sassonia and especially Prosper Alpino also taught that Galen was not entirely infallible in regard to the interpretation of the pulse. The work of Alpino already mentioned laid the foundation of semeiology as a special branch of instruction. In spite of the invention of the minute-watch by Peter Hele (also Henlein, died 1542), a locksmith of Nuremberg, counting the pulse still did not take the place of estimating its frequency.

The doctrine of critical days, as it related to practice, was still less properly reformed, though it was at least considered anew by Girolamo Fracastori (1483-1553), who referred such days to the prominence of a materies morbi (mucus conditioned a quotidian, yellow bile a tertian, black bile a quartan type), while mathematics and astrology (especially the influence of the moon) were taken into consideration by Amatus Lusitanus (died 1562), by the famous Nipho of Sessa in Calabria and many others, something in this style: "The body consists of four elements and the soul of three forces, hence the seventh day is the critical day; 7 plus 7, however, is 14, hence the 14th day is also critical" etc.

Yet we have, even to-day, substantially no more certain explanation of this subject!

b. Surgery.

The reform of surgical practice grew out of the change in the methods of carrying on war; for war, alas, has ever possessed the greatest influence, as well in promoting, as in retarding, the course of civilization. The daughter of war, surgery, was compelled, so to speak, to conform herself to the development of the former, although the ancient weapons continued to be frequently employed still in the 16th century. The transformation of surgery, however, may with more justice and accuracy be referred to a single man, than can be done with the practice of medicine, although he

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fashion, that Linacre, the founder of the College of Physicians, formed a statute to restrain apothecaries from carrying the water of their patients to a doctor, and afterwards giving medicines in consequence of the opinions they received concerning it. This statute was soon after followed by another, which forbade the doctors themselves to pronounce on any disorder from such an uncertain diagnostic.

It will scarcely be believed hereafter, that in the years 1775 and 1776 a German, who had been a servant in a public riding school (from which he was discharged for insufficiency), revived this exploded practice of *water-casting*. After he had amply increased the bills of mortality and been publicly hung up to the ridicule of those who had too much sense to consult him, as a monument of the folly of his patients, he retired with a princely fortune, and perhaps is now indulging a hearty laugh at the expense of English credulity."

Why should it not be believed? Do not "eminent" doctors now profess to diagnosticate not only diseases, but even conjugal compatibility, by a microscopic examination of the blood? And this not in 1775 but the year of our Lord 1886! (H.)

too could not have appeared without much that had gone before and much that was contemporaneous with him. The merit of this individual was based not so much upon any preconceived plan of action, as upon the systematic utilization of an accidentally fortunate experience in a position, and at a time, favorable to its development. It consisted simply in the experience that a piece of unexampled barbarity, the cauterization of gunshot wounds (up to this time generally regarded as poisoned), was by no means necessary for their cure, and that they in fact healed even better and with less pain under simple treatment with cold dressings and charpie, than after cauterization with boiling oil. To this was added the recommendation and practice of the ligation of arteries at the divided extremity,[1] with the inclusion of a small portion of muscular tissue. This, however, was known already to the Ancients, through them to the Arabians, and through both these to the mediæval surgeons, though it was discovered again by Paré independently. He—and this was new and important—introduced it into the practice of amputation, which latter operation too he performed through the sound tissues, and not, as had always been done heretofore, through the gangrenous parts only. He introduced it also in place of the cauterization heretofore employed, though the latter barbarity was not entirely supplanted by ligation until the 18th century. So long the prejudice against the new precedure endured! Every great and lasting improvement wins its way slowly, for it is repugnant to small minds. The unimportant and transitory alone arouses immediate enthusiasm. Dieffenbach compares the value of ligation in surgery to that of printing in general culture and of the railroad in commerce. With these two experimental facts (especially the first), which supplied to the future rather principles than simple matters of fact, begins a new era in the treatment of wounds. Thus

Ambroise Paré (1509 or 1510–1590), originally a barber and the son of a barber of Bourg-Hérsent near Laval in Maine, the father of modern surgery, furnished new proof that not the most learned, but almost exclusively the most gifted, have accomplished revolutions in the department of medicine also. He adopted the pious motto, which ought to-day, particularly, to be recalled to remembrance: "Je le pansay, Dieu le guarit". Moreover in practical life he followed the precept: "An approved remedy is much more valuable than one newly discovered"; and that other maxim which bears witness to his eminent character and his scientific spirit: "He who becomes a surgeon for the sake of money, and not for the sake of knowledge, will accomplish nothing". This character he preserved as well in the hard school of life as on the slippery field of the royal court, a model of the upright, courageous and frank Frenchman of the olden time. Like many great surgeons down even to the nineteenth century, Paré stepped from the barber-shop to his studies, and acquired the elements of his special knowledge in the Hôtel-Dieu. But he was also a great surgeon in war, the best school of surgery, in which he passed a great part of his life. He is said to have decided to pursue surgery from witnessing a case of lithotomy. As early as his 19th year, after becoming a barber-surgeon, he enlisted as such in the army of marshal Monte-Jan, during whose campaign the accidental want of hot oil suggested to him his first and most important surgical reform. In 1545 he published this in his treatise "La methode de traicter les playes faictes par hacquebutes et aultres bastons à feu etc.", written like a true surgeon in the French language. Shortly afterwards Paré was appointed a prosector and wrote a work entitled "Briefve Collection de l'administration anatomique etc." (1550), which, however, discussed also surgical and obstetrical subjects. In the campaign of the year 1552[1] he employed the ligature in amputations. Soon after his return he was appointed one of the twelve royal surgeons. In 1554 he was made, without any compensation — a very rare thing with the learned corporations of all times — a fellow of the Collége de St. Côme, though of course against the opposition of the professors of the University, who objected to him that he did not understand Latin. Ultimately Paré was advanced to the position of surgeon to king Henry II. (died 1559 of a wound inflicted at a tournament), at whose death he succeeded to the same office under Francis II. (1544–1560) and later also under Charles IX. (1550–1574). The latter is said to have protected him on the night of St. Bartholomew by concealing him under his own bed, though as Paré was a Catholic the story is doubtful. In 1573 appeared his "Deux livres de chirurgie", and in 1582 his "Discours de la mumie, des venins, de la licorne et de la peste". In the latter work he declared the remedies derived from mummies and from the unicorn[2] to be inactive, a statement which of course excited the violent opposition of almost the whole Paris Faculty, against whom the author was forced to publish a defence. Paré died full of years and highly honored by his nation, in spite of the fact that he was decried by the literati of his day as an ignorant upstart and plagiarist. In his native place, however, during the present century, a well-merited monument to his honor has been erected.

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[1] Paré, like other earlier surgeons, passed a curved needle around the artery, seized the latter with forceps (pince à corbin and pince à patin), and then tied it with a thread upon a thin pledget of linen. He included the nerves also in the ligature (as was done designedly too at a later period, to prevent the escape of the spirits), since the dangers involved in the ligation of nerves were not known until the 18th century.

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[1] Paré, like Larrey (whom the soldiers, in spite of their own dangers, bore off across the bridge of the Beresina upon their heads), was so beloved, that when he had slipped by night into Metz, the troops carried him through the city in triumph!

[2] The horn of the unicorn was regarded as the greatest of miraculous remedies, and was only rarely employed. It was represented by the tooth of the narwhal, an animal of extreme rarity. A specimen in Dresden was valued at that time at $75,000, and the Venetians vainly offered 30,000 zechins for another specimen. When a piece of the specimen at Bayreuth was sawed off, two delegates of princely rank were required to be present.

Besides the eminent services already mentioned, Paré merits further credit for the following improvements in surgery. He discarded the frequent dressing of ulcers, and castration in the so-called "radical" operation for hernia. He performed herniotomy in strangulated herniæ (most probably only at the suggestion of Franco), though this operation was often performed too in his day by itinerant herniotomists. He was the first surgeon to habitually employ trusses, though this instrument was already known to Antiquity. Paré also taught how to recognize induration of the prostate and fracture of the neck of the femur. He introduced the operation of staphyloplasty and an improved method of trepanning with the crown trepan, and invented numerous instruments, including feeding bottles for artificial nourishment. He performed bronchotomy, and employed the ligature in the treatment of fistula in ano; healed wounds of the nerves; circumscribed the employment of the actual cautery, particularly in operations for cancer of the breast; revived the operation for hare-lip with the figure of 8 suture, in which he was the first to follow the Arabians and Pfolspeundt; was the first to perform direct excision of the so-called "loose cartilages" in the joints, and was also acquainted with abscesses of the liver resulting from injuries of the head. Paré likewise improved the medico-legal doctrine of mortal wounds; practised amputation of the leg[1] at the point of election; taught version by the feet etc.

Paré permanently advanced surgery also by instructing numerous gifted and able pupils, both male and female, including his son-in-law

JACQUES GILLEMEAU (1550–1613),

physician of Charles IX. after the death of Paré, who also enriched both surgery (indicating, among other things, the Hunterian operation for aneurism) and obstetrics.

SEVERIN PINEAU (died (1619);

PIERRE PIGRAY (1533–1613),

a pupil of Paré and royal surgeon, who performed herniotomy after a peculiar method (Gyergyai);

NICHOLAS HABICOT (died 1624),

a surgeon and anatomist of Paris and a famous teacher, who regarded a skeleton 25 feet long as the remains of the aboriginal king Teutobocchus, while Riolan recognized it as the skeleton of a whale;

ADRIEN and JACQUES AMBOISE;

JACQUES DE MARQUE (1569–1622);

BARTHÉLEMY CABROL;

LOUISE BOURGEOIS etc.

PIERRE FRANCO (about 1550), of Turriers in Provence,

a surgeon at Freiburg, Lausanne, Berne and Orange, was distinguished, like all great surgeons, by his clear and simple literary style. He reformed lithotomy by the invention of the "haut appareil" (supra-pubic lithotomy), succeeding in a bold venture,[2] to which (after trying perineal section) he was forced by a very large stone in a child of two years. He also brought into credit the operation of herniotomy in

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1. Wounds of the head (at an earlier period the most frequent and most important), in consequence of the decline of the exclusive use of weapons for inflicting blows and cuts, receded both practically and scientifically before gunshot wounds of the limbs.
2. Since the days of Hippocrates wounds of the upper segment of the bladder had been regarded as mortal, because the flesh would fail to heal. Such was the idea even as late as the time of Brunschwigk.

strangulated hernia, and was the first to describe clearly the method by which, in the majority of cases, he preserved the testicles, when the patient did not desire the radical operation (Albert).

Finally the perfection of plastic surgery (already mentioned) by Tagliacozzi must be recalled here, as well as the artificial replacement of lost parts (artificial eyes, limbs, noses etc.), which Paré, who was likewise a good cosmetic surgeon, was particularly active in promoting.

c. Midwifery and Gynæcology.

With the name and age of Paré is also associated the reform of midwifery. This was due to the fact that operative midwifery, through the revival of podalic version (already clearly taught, e. g. in breech presentations, by Eucharius Rösslin[1] in 1513), made a great stride forward. The practice of Cæsarean section too on the living mother was promoted, and fell at least partially into the hands of men, and from this time forward midwifery was liberated from its dependence upon surgery and made an independent department. Yet the reform of Rösslin and Paré, in spite of the influential position of the latter, had no decisive influence upon this branch. Obstetrical butchery, on the whole, still maintained the upper hand during the 16th century. — With the advances already mentioned should also be classed the separate cultivation of the diseases of women.

Podalic version, even in head presentations, when the labor could not be otherwise completed, after falling into oblivion since the days of the Indians and Soranus, was subsequently permanently introduced on the recommendation of the French (1550). The German practitioner and thoroughly German writer of Worms, up to this period, was never seriously mentioned. Nicholas Lambert and Thierry de Héry,[2] shortly before the time of Paré, had performed the operation. Its technique and indications were specially determined by Pierre Franco, Guillemeau (1594), and the midwife of Marie de Medicis, Louise Bourgeois (born 1564). The latter was also the first to direct attention independently to the innocuousness of footling births. (The Ancients, as we know, considered them very dangerous and even fatal for both mother and child). Paré was the first to induce labor artificially at full term in cases of hæmorrhage (Corradi).

The first Cæsarean section on the living and parturient woman was practised by the sow-gelder, Jacob Nufer, of Siegershausen in Thurgau, upon his own wife, about the year 1500. After 13 midwives and several lithotomists had endeavored in vain to relieve her, her husband, having invoked the assistance of God and obtained the special permission of the governor of Frauenfeld, operated "just as on a sow" with such good fortune that the mother survived to the age of 77, and was able subsequently to bear several children — and even twins — in the usual way. Undoubtedly, therefore, the operation was unnecessary, and the same was true of many of the operations which soon followed; for Cæsarean section became the fashion for a short time. A sow-gelder is said to have removed the ovaries of his daughter, in consequence of her lasciviousness, during the 16th century (Weyer tells the story), so that such fellows and operative gynæcologists are to be considered the predecessors of Hegar, and to be praised accordingly.

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[1] "Item ob das kind sich mitt dem hindern erzeugte, so soll der hebamm mit yngelassner hâd das kind ober sich heben und mit den füessen uszfahren." (Edition of 1513 in possession of the author). Paré may perhaps have learned this operation from the French translation of Rösslin's work, and extended its application.

[2] This curious fellow was "Deputy of the king's first barber", and so famous, even at this period, as a "specialist in syphilis" that he became a rich man. Accordingly he often made pilgrimages to the grave of Charles VIII. at St. Denys, since this peculiar saint had introduced syphilis into the world.

As the result of this enrichment of the technique of operative midwifery by a simple sow-gelder, the Cæsarean section seems in the course of the 16th century to have been practised repeatedly, e. g. in Italy in 1540 by Christof. Bain, 1531, in Neusse, 1549, by Paul Dirlewang, on Marie Volceser, in Vienna etc. Now, however, it was performed in a somewhat more becoming fashion, and chiefly by barbers though some will admit as the first actual Cæsarean section only the one performed by surgeon Trautmann in Wittenberg in 1610.

The first writer on the Cæsarean section was

FRANÇOIS ROUSSET, (about 1581),

who studied at Montpellier and became ordinary physician of the duke of Savoy. His treatise, or rather its German translation, dedicated to a countess Palatine, bears a title like that of a penny-ballad: "Hysterotomotokia, seu De partu casareo, das ist: Von der im Fall äusserster not, wunderbarlicher und vor nie erhörter noch bewusster künstlicher lösung, cedirung, und scheydung eynes Kindes auss und von Mutterleib"[1] It enumerates 15 successful cases. Rousset also undertook extirpation of the kidneys (Albert), and was in general a good surgeon and operator. He performed herniotomy in strangulated hernia, and was acquainted with the musculature of the bladder. Still the opponents of the Cæsarean section were numerous, and included even Paré; for many of those operated upon died, and most of the "saved" afterwards bore children perfectly well in the natural way.

The 16th century also furnished indications of the subsequent employment of the forceps, the accouchement forcé, and the artificial removal of the placenta. Pierre Franco made the first effort to extract the head by means of an instrument like a vaginal speculum, and removed the placenta artificially. Guillemeau uttered a warning against the latter procedure, while he recommended the accouchement forcé in ante partum hæmorrhage. Finally Jacob Sylvius mentions the operation of symphyseotomy (theoretically).

Gynæcology was made a separate branch by Conrad Gesner, and then discussed by his pupil, Caspar Wolf (1532–1601 of Zürich, in some compendia, which the printer Waldkirch and Caspar Bauhin (1550–1624) followed with a similar book. The compilation of the last two was republished in 1597 by Israël Spach, professor in Strassburg.

RODERICUS À CASTRO (died 1627), a Portuguese Jew[2] who had settled in Hamburg, published in 1603 the next great gynæcological work.

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[1] The original French title was little less extensive: "Traité nouveau de l' Hysterotomotokie, ou enfantement césarien, qui est extraction de l'enfant par incision latérale du ventre et matrice de la femme grosse, ne pouvant autrement accoucher; et ce, sans préjudicier a la vie de l' un ni de l' autre, ni empêcher la fécondité maternelle par après: par François Rousset, medecin." Paris, 1581. The German translation was by Melchior Sebiz, and was dedicated to Elizabeth of Hesse. (H.)

[2] The Portuguese Jews at this time were especially distinguished for their erudition, and formed an intellectual aristocracy among their fellow-believers. Hence the

The reform of this "branch" was, as we have said, chiefly literary, and consisted simply in the separate study of the subject. This was also true of

d. Ophthalmology,

which for the first time was based, at least in some degree, upon observation and treated independently in his "Augendienst" in 1583 by Georg Bartisch (1535 to about 1606) of Königsbruck near Dresden, subsequently court-oculist of the Elector of Saxony and a pupil of "Meister Abraham Meyscheider". Bartisch again was not a learned, but rather a gifted man. He was also an "ordinary" surgeon, but treated his subject in a very different way from Benvenutus Grapheus (1340), who simply followed the eminent acquisitions of Antiquity. Even in those days the Germans proved their special talent for ophthalmology, which they have demonstrated anew in such an unexpected and brilliant degree in our own century. Everywhere else, in Italy, France and England, this continued for a long time to be simply a subordinate department of surgery and was cultivated only in accordance with the precepts of the Ancients.

Bartisch was an independent spirit and a man of character and heart, inspired by a love of his profession and of mankind, whom he saw outrageously maltreated in his own department. This aroused his righteous anger. This wrath and hatred (imbibed, as Göthe would say, from the plentitude of his love), his zeal for humanity, right and truth, stamped upon him the seal of a reformer and of a talented spirit. That, however, this truly assiduous, upright and conscientious man should be free from the superstition and medical credulity of his time is not to be expected. Accordingly we find in his work a great number of astrological prescriptions for all diseases and for the cure of everything, with warnings against incantations etc., especially against women (who were therefore to be entirely and especially excluded in all operations), and a mass of internal and external remedies.

The preparations necessary before operations, on the part of both the patient and the physician, are specified very carefully and circumspectly: the patient should continue fasting the whole day; the operating room should be light, and the bed well prepared etc.: the physician too should have drunk nothing for a few days previous to the operation, and should not have set up long by candle light; curiously enough too he was "to abstain entirely from conjugal duty with his wife for two days and nights before the operation", so that the possession of an ordinary practice in operating for cataract must have furnished by itself very good legal ground for divorce. Great weight was also justly laid upon instruments. The sole operation for ordinary

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Portuguese-Hebrew idiom, compared with the so-called Polish, is still regarded as the more polished. Persecuted for their faith, they wandered away to the Netherlands etc. — By the way, it may be remarked here that in Portugal too Germans were the first printers, and thus exercised a great influence upon its culture. Again during the 16th century German culture exercised generally, through the art of printing and the Reformation, the greatest influence upon the culture of all the people of that time. (B.)

A Portuguese Jew, Roger Lopez, captured in the defeat of the Spanish Armada (1588), became ordinary physician of queen Elizabeth, but was convicted of conspiring against the life of the queen, and hanged at Tyburn, June 7, 1594. (H.)

cataract — he distinguishes the white, gray, blue, green and yellow — is depression through the sclerotic. Besides this, operations for pannus, trichiasis, ectropium, fistula lachrymalis, symblepharon, and anchyloblepharon, tumors of the lids, exstirpatio bulbi, ptosis, the black cataract etc., were performed by Bartisch, and the diseases of the conjunctiva etc. were very carefully treated, indeed so carefully that even the devil and enchantments were exorcised and rendered harmless by amulets. This was rather the fault of his time than of himself. Bartisch laid great weight upon the after-treatment of operations, a subject upon which the "eye-destroyers" of that day had nothing at all to say. On the contrary he justly prides himself upon it, and upon the fact that he attends to it himself. He utters a word of warning against "Prillen"[1] (spectacles), which were the fashion even in his day.

How highly Bartisch, in contrast with the "couchers and eye-destroyers" of his day, estimated the responsibility and the calling of the operative oculist may be inferred from the fact that he insisted on the utmost possible technical dexterity, and an equal use of both hands. He therefore declared even drawing and travelling useful for the physician, since "man becomes more ingenious and meditative through painting and travel, qualities which are of great advantage in the healing art." All this he had himself experienced, and in it everyone to-day must agree with him!

Popular books on the treatment of the eyes also made their appearance early in the 16th century, e. g. "Ein neues hochnützliches Buchlein von erkenntniss der krankheiten der augen" etc., by Vogtherr of Strassburg in 1538.

[A similar popular treatise, entitled "A brief treatise of the preservation of the eye-sight", was composed by Walter Bailey, Queen's Prof. of Physic in Oxford and ordinary physician of queen Elizabeth. Bailey was born at Portsham in Dorset in 1529 and died in 1592. The precise date of the first edition of his work is unknown, but the second edition appeared in 1616. Another work by the same author, entitled "A discourse of three kinds of pepper in common use", was published in 1588, and the first edition of his treatise upon diseases of the eyes probably appeared about the same time. The latter was a small 12mo volume, and is important only as the earliest contribution of England to the science of ophthalmology. (H.)]

3. CULTIVATION OF THE PRACTICAL BRANCHES.

The liberation of medicine from the sway of Galen and the Arabians, as well as the spirit of medical observation and investigation, newly excited by the study of the Ancients (especially Hippocrates) and the new theoretical views, manifested their influence of course also upon the writings and text-books of the 16th century. This was seen chiefly in those works on the subject of

a. Medicine,

although, quite naturally, in accordance with the stand-point of the authors concerned, more or less of mediævalism was preserved. Among these are found even some who were hostile, indeed, to all innovation, yet obeyed unwittingly the new spirit. We notice the following:

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[1] The earliest attempt to explain the optical working of concave and convex lenses was made by the Italian, Franc Maurolycus (1494–1595). He also thought that the effect of the crystalline lens of the eye was that of a convex lens (Magnus).

a. ITALIANS.

As representatives of the new tendencies, although their activity still belonged in part to the fifteenth century, we mention: Baverius de Baveriis (about 1480), Benivieni, Benedetti and Manardo. To these we may join Montanus, who has also been already named. Further:

ALOYSIO MUNDELLA (died 1553) of Brescia,

a vigorous opponent of astrology and the efficacy of precious stones and amulets, as well as a good observer and a simplifier of treatment.

VETTORE TRINCAVELLA (1496–1568)

also belongs here through his "Consilia", which contain numerous medical histories. He observed, among other things, that hereditary diseases may skip one generation.

TADDEO DUNO (1523–1613).

who acquired eminence in the dispute relative to venesection, and wrote on semi-tertian fever.

GIROLAMO FRACASTORI (1483–1553) of Verona,

for a long time ordinary physician of Paul III. during the Council of Trent, wrote a treatise "De morbis contagiosis", and a famous poem on the most unpoetical subject of syphilis.[1] In the latter he, like Hutten, praises the guaiac, and declares coitus the chief cause of infection.

ALESSANDRO MASSARIA (1510–1598)

composed, among other works, a pathological text-book and some writings on the plague, small-pox etc. He was, however, such a partisan of Galen that he originated the notorious maxim (recalling that of Archigenes) that it was better to err with Galen than to maintain the right with the Moderns. This esteem for Galen was also shared by

FRANC. VALLERIOLA (1504–1583),

a practitioner in Valence and finally professor in Turin, and a fertile author and good observer.

NICOLO MASSA (1499–1569) of Venice,

a famous practitioner, wrote on contagious diseases, including the plague, petechial fever, measles, small-pox and buboes, and especially syphilis, in which he frequently recommends preparations of mercury, as well as a decoction of sarsaparilla, thus anticipating Zittman. He is also the first writer to point out syphilis as the cause of mental diseases (Proksch), and regards it as contagious and the cause of articular pains (Purjesz). Massa also made some good individual observations. A good therapeutist was

LUDOVICO SETTALA (1552–1632, Septalius) of Milan,

who studied in Pavia, was extraordinary professor in that university for two years, and subsequently a professor and the first state-physician in Milan.

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[1] Many subjects were at this time discussed in verse after the manner of the Ancients. Fracastori too was a contemporary of Ariosto and Tasso, and belonged to the second bloom of poesy in Italy. He was the author of the term "syphilis", or the fable of the herdsman "Syphilos", who is said to have first had the disease. In this way he assisted in putting an end to the dispute over the paternity of the disease, a dispute which was raging between the various nations of his day (Proksch). The name syphilis has also been derived from *συμφιλεῖν*, or *σῦς* (genitalia muliebria) *φιλεῖν*.

Antonio Musa Brassavola (1500–1555) of Ferrara

accepted 234 different varieties of syphilis, and performed the first tracheotomy of the Modern Era, making a transverse incision between the cartilages.

Ercole Sassonia (1550–1607),

in addition to works on syphilis (syphilis larvata), the urine and the pulse, wrote also on the plague, Plica Polonica, and a comprehensive text-book.

Oddo degli Oddi

wrote on the plague. His son

Marco degli Oddi, with

Albertino Bottoni (died 1596),

was one of the first to give actual clinical instruction (in Padua). He also wrote on the diseases of women. The eminent observer,

Petrus Salius Diversus (Salio Diverso, about 1580) of Faënza,

discussed the plague and its treatment, and mentions inflammation of the cerebral cortex and of the diaphragm, phthisis sicca etc.

Marcello Donato (died about 1600),

a physician of Mantua, private secretary and counsellor of Vincenzo Gonzaga, distinguished himself by his freedom from prejudice and his zeal in the collection of observations. Among the latter we may notice a case of lactation in a man, apparent pregnancy due to hydrometra, paralysis resulting from division of the nerves of motion.

Fortunatus Fidelis (died 1630),

a physician of Palermo, is eminent for the independence of his ideas and his thoughtful observation. He disputed all authority, particularly in therapeutics, and not excepting that of Hippocrates, and with a clear intellect considered no medicine in many cases the best treatment! He was also the first physician to develop the subject of state-medicine,[1] pointing out, among other things, the injuriousness of lead pipes in the conduction of drinking-water.

Amatus Lusitanus (his Christian name was Juan Roderigo da Castello Bianco, born about 1510),

who has been already once mentioned, and who was a nominal convert from Judaism, born at Beira in Portugal, but a teacher in Ferrara, finally declared publicly his continuance in Judaism, after becoming a professor in Thessalonica. He was, indeed, a great partisan of Galen, but also distinguished himself as a good observer in his "Curationum medicinalium centuria VII." Also the Portuguese

Rodriguez da Fonseca (died 1622) of Lisbon

taught in Pisa and Padua, and belonged rather more to Italy than to his native land.

β. SPANIARDS.

Spain, in her palmy days, also took considerable interest in the struggles of medicine. Thus

Christobal de Vega (1510–1580),

who has been already mentioned, published a work entitled "De arte medendi liber", in which he advanced a mixture of Galenism, Scholasticism and Arabism, but also furnished a few good ætiological hints. He mentions that in his time brandy was a common drink, gives even culinary receipts, and in cases of weakness of memory puts aromatic drugs in the nose. Much more important, however, is the "Methodus medendi" of Francesco Valles (Vallesius, about 1589). Francesco Lopez de Villalobos (1473–1560), ordinary physician of Charles V. and Philip II., in his "El sumario de la medecina con un tratado sobre los pestiferas bubas" (Salamanca, 1498), gives us one of the earliest descriptions of syphilis. Luis Lobera d' Avila, likewise ordinary physician of Charles V., as well as a syphilographer, wrote, among other works, a "Banquetos de nobles Caballeros", furnished with woodcuts by Hans Burgkmair. These cuts represented the author in his study, as well as certain medico-chirurgical operations. Juan Huarte wrote a work entitled "Examen de ingenios para las sciencias" (Baeza, 1575), subsequently translated into French by several different authors.

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[1] His "De relationibus medicorum libri IV, in quibus ea omnia, quæ in forensibus ac publicis causis a medicis referri solent, plenissime traduntur" was published at Palermo in 1602. (H.)

LUIS MERCADO (Mercatus, 1520–1606),

like Vallesius, ordinary physician of Philip II., in spite of his scholasticism, wrote well on the subjects of the plague, typhoid fever, Garotillo, and other epidemic diseases. Equally eminent for their epidemiological writings were: Francesco Bravo (about 1571), a physician of Mexico, who described the Tabardete or Tabardillo; Luis de Toro (about 1574) of Piacenza, who wrote on the same disease; Onofre Bruguera (about 1563), professor in Barcelona, who described the catarrhal fever (influenza) of the year 1562; Nicolas Bocangelino (Bocangel, about 1600) of Madrid, a champion of contagion in epidemic diseases, and author of a treatise on the plague and malignant affections; Juan Tomas Porcell (1565), professor in Saragossa and author of a treatise on the plague dedicated to Philip II. Francesco Diaz (about 1575), ordinary surgeon of Philip II. and a professor in Alcala, wrote a "Compendio de cirujia" with treatises on diseases of the bladder and kidneys, on the plague etc. Finally the noble monk

PEDRO PONCE DE LEON[1] (died 1584)

should be mentioned here with honor as the founder of a system of instruction for the deaf and dumb.

γ. FRENCH.

JEAN FERNEL (born near Amiens about 1497, died 1558),

wrote a complete text-book of pathology (anatomy, physiology and therapeutics), entitled "Medicina universa", in which he advanced views of pathological solidism, and indicated his sympathy with psychical theories. He classified diseases into those of the tissues (similares), those of the organs (organici) and those depending upon loss of cohesion (communes), in which subordinate divisions were also laid down. Though a partisan of Aristotle, he was still very devoted to Galen, and of course an anti-mercurialist, while his famous friend

GUILLAUME BAILLOU (Ballonius, 1536–1614; according to others 1538–1616) of Paris

depicted in excellent language the forms of disease which he had faithfully observed in the true Hippocratic method. He is also regarded as the first who demonstrated post mortem the existence of laryngeal croup. Among the

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[1] Isensee calls him Pedro de Ponce. According to the accounts of his contemporaries the method of this physician must have been very successful. He first taught his pupils to write, then pointed out to them the various objects represented by the different words, and finally conveyed to them the sounds corresponding to the characters by observation of the motions of his lips etc. (H.)

δ. Germans,

who, as we know, occupied a high grade in all other sciences as well as in art and technics, a brisk activity prevailed also in the department of medicine, as compared with the preceding century. Thus the earlier theologian, a pupil of Luther and Melanchthon,

Johann Crato von Krafftheim (1519–1586),

ordinary physician of three emperors, after studying medicine in Verona and Padua became finally a good observer and a sober physician. Born in Breslau, he practised there and in Augsburg until appointed ordinary physician of Ferdinand I. (1503–1561), a position which he retained under Maximilian II. (1527–1576) and Rudolf II. (1552–1612).—Less eminent, though also educated in Italy, was

Rainerus (Reinert) **Solenander** (1521–1596),

ordinary physician of the duke of Cleves, like Diomedes Cornarus (died 1598), ordinary physician of Maximillan II. We should also mention

Thomas Jordan (1539–1585),

city-physician of Brünn in Moravia, famous for his description of the "Lues Pannonica" and for an account of more than 200 cases of syphilis contracted in Brünn from the employment of infected cupping-glasses in the hands of a certain bath-keeper.

Joh. Schenk von Grafenberg (1531–1598), of Freiburg in the Breisgau,

was distinguished for his observations, both original and collected from other writers. They included descriptions of monsters developed only in the fancy of the writer but which excited great interest in their day.

Felix Platter (Platerus, Plater, 1536–1614),

a zealous and careful observer, son of the Swiss, Thomas Platter, of the valley of Zermatt (a man sprung from the deepest poverty, and the product of a most wretched student-life — he had been a "fahrender Schüler), is to be equally esteemed as a man and a physician. Educated in Montpellier, a professor in Basel and ordinary physician of the margrave of Baden, he was the earliest systematic nosologist dividing diseases into three classes: 1. Disturbances of function (diseases of the mind, the senses and of motion); 2. Pains (febrile diseases) and diseases of the fluids; 3. Defects (of formation and secretion). Both the Platters left autobiographies.

ε. Dutch.

Joh. Wyer (Weyer, Wierus, 1515–1588) of Grave in Brabant,

who merits immortal fame for his opposition to the belief in witches, deserves mention also as a writer on epidemic diseases, particularly the English "sweating sickness" and scurvy. He was likewise acquainted with amenorrhœa due to an imperforate hymen, and treated it by incision of the membrane. He enjoyed rich opportunities to make observations upon all these subjects during his travels in Africa, Greece and Holland. Wyer finally became ordinary physician of the enlightened duke William of Cleves, while his countryman

Rembert Dodoëns (Dodonæus, 1517–1585),

who distinguished himself as a pathological anatomist, epidemiologist and careful observer, was ordinary physician to Maximillan II. and Rudolf II.

Peter van Foreest (Petrus Forestus, 1522–1597) was prominent among his contemporaries for his numerous observations, including some which are not to be classed as mere curiosities. His varying residence — he studied in Louvain, Bologna, Rome and Paris, and practised at Pluviers in France, Delfft, Leyden and Alkmaer, his native town — must have furnished him rich opportunities for observation.

Thomas Fyens, already mentioned, professor in Louvain, and his father, **Johann Fyens**, a physician in Antwerp, also distinguished themselves as observers. The latter also wrote an excellent monograph "De flatibus", while both father and son, like many of the physicians here named, were not exempt from the superstition of their day.

Jodocus Lommius (his real name was Joost van Lom, about 1560) of Buren in Gelderland, city-physician of Tournay and Brussels, wrote in the style of Hippocrates a "De curandis febribus continuis liber" and "Medicinalium observationum libri tres", both of which survived numerous editions. In these works he studied semeiology synthetically. A good observer and fertile author was

Jan van Heurne (Johannes Heurnius, 1543-1601) of Utrecht, who studied in Italy, and then became physician of several of the higher princes, including the unfortunate count Egmont (1532–1568). He was finally appointed a professor in Leyden, and became famous through some successful cases — the treatment of the count of Noortcarmes, who had been poisoned, and the Princess Emilie, sister of Maurice of Nassau, who endeavored to starve herself in return for unrequited love.

ζ. THE ENGLISH.

At the beginning of the 16th century the study of the classics was so popular in England that numerous translations of the ancient authors appeared, and a knowledge of the literature and language of the Ancients — a sign of improved education — was familiar even to the "ladies". During this century the English national literature (Marlowe, Sidney, Fletcher, Beaumont, Shakespeare) matured, and at its close England had attained the meridian of her political and literary greatness. Yet, in spite of all this, English medicine during the 16th century remained surprisingly far behind that of the other civilized nations. Linacre and John Kaye are its sole prominent representatives, and these, in their day, were so highly esteemed that they shared the honor of that greatest recognition of intellectual greatness in England — a tomb in Westminister Abbey.

These two physicians emancipated English medicine from the control of the clergy, and at the same time laid the foundation of the self-government of English physicians. Heretofore licenses to practice had been granted by the bishops. Linacre founded the College of Physicians in London; Kaye established Caius College in Cambridge (where a century later a Harvey received his education), and likewise described the English "Sweating-sickness". In Scotland the university of Edinburg was founded in 1584.

[The comparative dearth of English medical literature during the 16th century will seem less surprising when we reflect that the development of English literature in general was exceedingly slow until the latter half of the reign of Elizabeth (1558–1603), when, almost at once, it burst forth into the full bloom of maturity. The poems of Wyatt and Surrey, which heralded the coming change, did not appear until 1557; Sackville's first tragedy appeared in 1561; Lyly's "Euphues" in 1579; Sidney's "Arcadia" in 1580; Marlowe began to write in 1586; Spenser's "Faerie Queen" appeared in 1590; Shakespeare's "Venus and Adonis", which he calls "the first heir of my invention", was published in 1593; Ben. Jonson's first comedy appeared in 1596; Bacon's "Essays" in 1597, while the works of Beaumont and Fletcher did not appear until the early part of the 17th century. "The renascence had done little for English letters. The overpowering influence of the new models both of thought and style which it gave to the world in the writers of Greece and Rome was at first felt only as a fresh check to the revival of English poetry or prose. Though England shared more than any European country in the political and ecclesiastical results of the new learning, its literary results were far less than in the rest of Europe, in Italy, or Germany, or France. More alone ranks among the great classical scholars of the sixteenth century. Classical learning, indeed, all but perished at the universities in the storm of the Reformation, nor did it revive there till the close of Elizabeth's reign" (Green).

The comparative barbarity of England during the first half of the 16th century is, perhaps, not generally appreciated. None of the streets of London were paved until 1534, and the first carriages appeared in 1564; knives were not made in England until 1563, and forks were still uncommon in 1608. The substitution of the gentleman's rapier for the two-handed sword of the warrior, which marks the change of feudal into court life, did not occur until 1578. Harrison, writing in 1580, calls attention to the recent change of wooden into brick or stone houses, to the common use of glass for windows, to the recent frequency of chimneys, "whereas in their young daies there were not above two or three, if so manie, in most uplandishe townes of the realme"; to the great improvement in beds and bedding, "although not generall, for our fathers (yea and we ourselves also) have lien full oft upon straw pallets, on rough mats covered onelie with a sheet, under coverlets made of dagswain or hop-harlots, and a good round log under their heads, instead of a bolster or pillow. If it were so that the good man of the house had within seven yeares after his marriage purchased a matteres or flocke-bed and thereto a sacke of chaffe to rest his head upon, he thought himselfe to be as well lodged as the lord of the towne. . . . Pillowes (said they) were thought meet onelie for women in childbed. . . . The third thing is the exchange of vessell, as of treene platters into pewter, and wodden spoones into silver or tin; for so common was all sorts of treene stuff in old time, that a man should hardlie find four peeces of pewter (of which one was peradventure a salt) in a good farmer's house." (See Taine's "History of English Literature".)

The political independence of England too was not fully assured until the defeat of the "Armada" in 1588. Henry VIII., in the beginning of his reign, possessed one single ship of war; Elizabeth sent out 150 to encounter the Armada.

Besides the English medical authors already mentioned, and who must be regarded as the best representatives of English medicine in the 16th century, we may also mention:

Andrew Borde (Boorde, Perforatus; died in prison 1549), an alumnus of Montpellier and professor at Oxford, who is said to have also been ordinary physician of Henry VIII. He wrote "A Breviarie of Health", printed in black letter in 1547, in which he advises for toothache depending upon worms "a candell of waxe with henbane seeds, which must be lighted so that the perfume of the candell do enter into the tooth." We have also from his pen a "Compendyous regiment, or dietary of health, made in Mount Pyllor", published posthumously, at Oxford, in 1562. He is said to have been a man of much wit, and to have been in the habit of frequenting fairs and markets, where his humorous speeches made him quite popular with the masses. Hence arose our term "merry Andrew", to designate the class of itinerant quacks who adopted his style.

William Bulleyn (died 1576), who ranked high as a botanist and physician during the reigns of Edward VI., Mary and Elizabeth. Educated at Cambridge, he travelled extensively in Germany and Scotland, and practised in Norwich, Blaxhall, Durham and London. His works were entitled: "The Government of Health" (London, 1548); "Book of Simples"; "A Dialogue between Soarenes and Chirurgi", and "A Comfortable Regiment and Very Wholesome order against the most perilous Pleurisie". Bulleyn was a firm believer in witchcraft and the medical virtues of precious stones, but his works furnish very valuable information of the medical customs of his day.

William Turner (died 1568), an eminent physician, naturalist and theologian, the friend and follower of bishop Ridley. He was educated in Italy, receiving his doctor's degree at the university of Ferrara. In consequence of his reformative religious views he was banished from England under Henry VIII., and spent a considerable time in Cologne and Weissenburg. On the accession of Edward VI. Turner returned to England, and was appointed Dean of Wells, but was again driven into exile under the succeeding reign. During his travels on the continent Turner employed his leisure in collecting specimens of plants, and on his final return to England after the accession of Elizabeth he wrote and published his chief work, entitled: "A new herball etc.", the first part of which appeared in 1551. Parts II. and III. followed in 1562 and 1568. He also wrote works on the bathing-resorts of England and the continent, on ornithology, the nature of the wines used in England etc. Turner was a contemporary and a warm friend of Gesner.

We should also mention Sir Thomas Elyot, whose "Castel of Health" appeared in 1534; Thomas Phayer, author of "The Regiment of life, whereunto is added a treatise of the pestilence with the Book of Children" (1544); Nicholas Gyer, who published in 1592 "The English Phlebotomy; or a Method and Way of Healing by Letting of Bloud", in which he combats the popular idea of the necessity of regular and periodic bleedings to preserve health; George Etheridge (born 1518), Regius professor of Greek at Oxford and practising in that vicinity, an eminent mathematician, linguist, musician and poet, who wrote "Hypomnemata quædam in aliquot libros Pauli Æginetæ etc.", London, 1588; Timothy Bright (died 1616), a physician and theologian, author of a "Treatise on melancoly", London, 1586; "Hygieine, seu de sanitate tuenda" (1588), with other works; Thomas Gibson (died 1562) of London wrote a work on the prophylaxis and treatment of the plague (1536). D. Marten, "Glass of health" (1540); Thomas Hollybush, "Excellent physic book for alle the griefs and diseases of the body etc." (1561); Philip More, "Hope of health etc." (1565); Thomas Morgan, "Haven of health" (1589); Francis Record, "Urinal of physik" (1582); Thomas Brasbridge, "The poor man's Jewel etc." (1578); Simon Kelling, "Defensative against the plague" (1593); William Tooker, "Charisma, seu donum sanitatis etc." (1597); George Baker, "The practise of the new and old phisicke etc." (1599), and many similar writers. Other eminent physicians, who, however, left no writings to preserve their fame to posterity were: John Clement (died 1572), Thomas Francis, ordinary physician of queen Elizabeth; Doctor Butts, ordinary physician of Henry VIII., whose name has been immortalized by Shakespeare; William Kunyngham, Thomas Paynell, the translator of the Schola Salernitana, etc. (H.)]

b. Surgery,

(a branch, which fortunately has never had to occupy itself with theories. since its subjects submit themselves with more definiteness to our knowledge and recognition) under the hands of surgeons educated, for the most part, in guilds alone, but yet ingenious in their department, was enriched with much that was new and capable of immediate and profitable employment in actual life. For, as Würtz thought: "In surgery much more depends upon dexterity and experience than on lengthy twaddle." From this century onward it manifested a steady advance, and, as everyone must admit, a much more satisfactory development than medicine. Prior to, and along with, the reform of surgery, which emanated chiefly from the French, the cultivation of this branch was a subject of special interest to

a. THE ITALIANS,

in continuation of their great activity in this department during the Middle Ages. Through the invention of powder and firearms, and the consequent introduction of gun-shot wounds into surgery, this branch now received a special impulse. The improvement of the study of anatomy was also of great benefit to it, since most of the famous Italian anatomists of that period were surgeons too, and furnished to surgery, which they also taught, a scientific foundation. Rome and Bologna, particularly, enjoyed and educated a long line of eminent surgeons.

The father of the so-called Roman School was

GIOVANNI DE VIGO (Ludovico, 1460–about 1519) of Rapallo near Genoa,

subsequently physician of the art-loving pope Julius II. (1503–1513). Without any considerable erudition, Vigo practised, on the whole, a mere "salve-surgery", and the emplastrum de Vigo — mercurial plaster — bears his name to this day. He regarded gunshot wounds as poisoned, and accordingly cauterized them with the hot iron (this he used frequently), or with boiling oil, thus laying the foundation of this vicious treatment of such injuries. He still considered great operations quite unworthy of a physician, and believed that these should be abandoned to the itinerant inferior surgeons. Yet he introduced the crown trepan, and practised the ligation of the Ancients (transfixing the artery itself with needles and tying it above these). He also discussed syphilis fully in his larger and smaller surgical compendiums. His father,

BATTISTA DI RAPALLO,

is said to have been the inventor of the method known as the "apparatus major" in lithotomy, and by him it was made known first to Giovanni de Romani of Cremona, and ultimately to Mariano Santo di Barletta (1489–1539 or 1550), who published a description of it in 1531. From the latter the method was learned by Ottaviano da Villa, an itinerant surgeon devoted to the practice of lithotomy, who communicated it to Colot, and thus the method reached France. A pupil of Ottaviano was

MICHEL ANGELO BIONDO (Blondus, 1497–1565) of Venice,

who rendered an important service to surgery by his use of warm and cold water in the treatment of wounds, though in other respects he was a devoted follower of the Ancients.

Alfonso Ferri (born about 1500) of Faënza,
after 1534 ordinary physican of Paul III. (1534–1549), deserves no credit for his treatment of gunshot wounds, which he still regarded as poisoned and even treated with internal remedies, but he rendered excellent service to surgery by his treatment of syphilitic strictures of the urethra. He observed that balls might remain in the body more than twenty years without bad consequences, and he also practised ligation in hæmorrhage.

To the so-called School of Bologna belonged, among others:

Angiolo Bolognini,
professor at Bologna from 1508 to 1517. The most important army-surgeon of that day, rivalling even Paré, whose teacher he had probably been, was

Bartolomeo Maggi (1516–1552) of Bologna,
who established by his own investigations that gunshot wounds could be neither burned or poisoned wounds, for which reason, after removal of the ball, he employed simply soft oiled dressings, and did not cleanse the wound too often. In gangrene he amputated through the sound parts, leaving sufficient skin to cover the stump. Another surgeon of great eminence was

Giacomo Berengario (Bérenger, Berengarius, died 1550) of Carpi,
who treated gunshot wounds quite as simply as Maggi, but managed wounds of the skull with much less reliance upon the powers of nature, for in these he employed the trepan. He extirpated the prolapsed uterus,[1] and treated syphilis by mercurial innunction with such success, that (as Cellini relates) he could not show himself but once in any one place without running the risk of his life. Matthiolus had already administered mercury internally. In strangulated hernia Berengario knew no treatment save manual taxis, after softening the fæces per intra et extra. His pupil

Giulio Casserio (1561–1616)
handed down the method of bronchotomy practised by Fabricius ab Aquapendente, while a pupil of Falloppio (who, like most anatomists, was himself a surgeon, and wrote on tumors and ulcers),

Giambattista Carcano Leone (1536–1606) of Milan
discussed wounds of the head. The same subject occupied the attention of Pietro Martire Trono (about 1580), and numerous others of this period. Besides the anatomists already mentioned, the following physicians interested themselves in the promotion of surgery:

Botallo (amputation by means of a sort of guillotine); Falloppio (author of the well-known maxim, that the road to surgery leads through anatomy); Ingrassias (1510–1580); Guido Guidi (died 1569), and particularly Hieronymus Fabricius ab Aquapendente (1537–1619), who, however, was also eminent as a surgeon, mentioning goitre, and, according to Ferd. Fuhr, the first to differentiate it anatomically from other tumors of the neck (its extirpation (?) is first mentioned by Fabricius Hildanus), practising trepanning, hanging up the patient by the feet in strangulated hernia etc. To this period belong also Giovanni Andrea della Croce, a physician and teacher of Venice (about 1560), who improved the trepan, and seems to have been in general a bold surgeon; and Durante Scacchi of Calabria, a decendant of the old medical colony of the Preciani or Norsini. How bold the surgeons of that day were, may be inferred from the example of Zaccarelli, a surgeon of Palermo, who, in 1549, undertook the extirpation of a spleen weighing about two pounds. The patient recovered in 24 days.

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[1] It may also be remarked *en passant* that Berengario considers the direction of the face towards the anus during parturition a designed and punitive reference to original sin!

β. French.

Before the time of Paré flourished the famous French surgeon

Jean Tagault (died 1545),

a native of Vimeu in Picardy, and professor at Paris and Padua. We must also notice

Étienne Gourmelen (died 1593),

professor of surgery at Paris, and an opponent of Paré. In seeking to describe the character of the latter, Gourmelen betrayed his own, when he said: "An ignorant and fool-hardy man has recently ventured, in his ignorance, to discard the cauterization of the vessels with the hot iron, and to substitute for it a new procedure, viz.: the use of the ligature — a proceeding contrary to all the precepts of the ancient physicians, and opposed to all the principles of sound reason etc." (Wernher). André Dulaurens (died 1609), ordinary physician of Henry IV., a physician who performed paracentesis through the navel; Jean Girault of Lyons; Antoine Chaumette (about 1560); the more eminent Jacques Dalechamps of Lyons (1513-158 Philippe de Flesselle (died 1562); Laurent Joubert (1529–1583), whose "Traité du ris" suggests by its title a French Democritus, and finally François Ranchin (1565-1641) who commented upon the works of Guy de Chauilac. The

γ. Spaniards

attained in the 16th century their greatest power and chief importance in the history of civilization, as well as the meridian of their medical achievements. What Spanish surgery (and medicine) accomplished in the age of Charles V. and Philip II., or rather the fame which it then enjoyed, was never surpassed, indeed, was never equalled, in after times; just as Spanish historical composition, poetry (Cervantes, Lope de Vega etc.), sculpture and painting, never again were able to attain their grade of that day. Upon this lofty ascent followed, even before the close of the century, a more abrupt fall than ever occurred to any other people. The precious metals of America, by facilitating luxury and indolence (henceforth national and pregnant characteristics of the Spanish race), corrupted the physical and mental power required to maintain their ascendancy. The most famous Spanish surgeon was

Francesco de Arce (Arcæus, Arceo, 1493–1573) of Fregenal,

surgeon in Llerena and Valverde in Estremadura, who was justly so highly esteemed, especially as an operator, that patients visited him from foreign countries. His name is preserved to us to-day in the balsamum Arcæi (unguentum elemi).

Andreas Alcazar (about 1575) of Guadalaxara,

professor at Salamanca, like Arcæus, was a friend of the trepan.

Bartolomæus Hidalgo de Aguerro (1531–1597)

was also a surgeon very highly esteemed in Spain. He was even called the Spanish Paré, and defended first intention, or rather the immediate union of wounds.

Juan Fragoso (about 1570),

ordinary surgeon of Philip II.; the famous army-surgeon Dionisio Daza Chacon (1503? 1510–1596?), who held the same office under Charles V. and again under Philip; Michael Juan Pascal, a surgeon of Valencia (about 1548), and even Abraham Zacuto (Zacutus Lusitanus, 1575–1642), a Jew, born in Lisbon, and a partisan of Galen and the Arabians, are also worthy of mention.

The Portuguese Amatus Lusitanus (born 1511, not to be confounded with the preceding physician), together with Ferri, diffused the knowledge of the urethral bougies invented by professor Aldarete of Salamanca, and employed by the itinerant surgeon Philip. These instruments, in consequence of the increasing frequency of syphilitic strictures, came more and more into use. Among the

δ. English,

who still possessed few higher surgeons, there lived, among others, at the close of the 16th century: Greenfield,[1] a lithotomist, who immigrated from Holland; Thomas Gale[2] (1565); John Banister[3] (1575); John Read (1588) and John Hoster,[4] a Paracelsist. A surgeon John Woodall,[5] who even performed primary amputation, also enjoyed much reputation.

[Other English surgeons of this period were:

George Baker, ordinary surgeon of queen Elizabeth, and president of the College of Surgeons of London in 1597. He was the author of numerous surgical and medical works.

Peter Lowe, a Scotchman, who studied in Paris and practised for many years in Spain, France and Flanders, but in his old age returned to Glasgow and published "The whole course of chirurgerie, wherein is briefly set down the causes, signs" etc., London, 1596; and "An easie, certain and perfect method to cure and prevent the

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1. John Greenfield is the English synonym of Jan Groeneveldt, a native of Deventer (Overyssel), and a pupil of the famous Dutch lithotomist, Lambert Velthuysen (born 1622) of Utrecht. Accordingly he belongs to the 17th, not the 16th century. Groeneveldt, who, like his master, was an eminent lithotomist, settled in London, and met with such success that he finally adopted his new home, and Anglicised his name into John Greenfield. His works were written in Latin and English, and relate chiefly to his own specialty. Among them we may mention: "*Λιθολογία*. A treatise of the stone and gravel etc." (London, 1677); "A complete treatise on the stone and gravel etc" (London, 1710); "Dissertatio lithologica variis observationibus et figuris illustrata" (London, 1684). (H.)
2. Thomas Gale (1507-1586), sometimes called the "English Paré", was an eminent army-surgeon under Henry VIII. and Elizabeth. He finally settled in London, where he published in 1563 "An excellent treatise of wounds made with gun-shot" etc. and "An enchiridion of chirurgerie" etc., with other surgical treatises. He opposed the opinion that gun-shot wounds were "poisoned", and advocated simple treatment. (H.)
3. John Banister was an eminent surgeon of Nottingham. He wrote "A needful, new and necessary treatise of chirurgery" etc., London, 1575; "The history of man sukked from the sappe of the most approved anatomists in this present age" etc., London, 1578; and other surgical works. (H.)
4. Haller calls him Hester, and ascribes to him a treatise, entitled "Compendium secretorum rationalium", London, 1582, and "The pearle of practice, or pearle for physik and chirurgerie", London, 1592. (H.)
5. Woodall was in 1589 surgeon of the troops sent by Elizabeth to the aid of Henry IV. of France. After extensive travels upon the continent, he finally settled in London, and was appointed Surgeon General of the East India Company in 1613, and surgeon to St. Bartholomew's Hospital in 1615. In 1626 he published a handbook, entitled "The Surgeon's Mate", and two years later the "Viaticum, being the pathway to the surgeon's chest." His collected writings, entitled "Various treatises" etc., appeared in 1639. (H.)

Spanish sickness", London, 1596. Lowe was for many years the chief surgeon of western Scotland, and in 1599 received from king James VI. a charter for the foundation of the Faculty of Physicians and Surgeons of Glasgow. He died in 1612.

William Clowes, an eminent surgeon of London, consulting surgeon to St. Bartholomew's Hospital and ordinary physician of queen Elizabeth in 1596. He wrote a treatise on the cure of syphilis by inunction (1575), which survived many editions and also a treatise on gunshot wounds, in its day very popular.

Richard Caldwell (1513-1584), president of the College of Physicians of London (1570), in which he founded a chair for instruction in surgery. John Veyrery and Marcellus de la More were surgeons to king Henry VIII., and William Goodoums "Serjeant Surgeon" to queen Elizabeth. H.]

The surgery of the

e. Germans

during the 16th century had its headquarters in Strassburg and Basel, cities which were united by contiguity with Italy and France, and were accordingly able to get from these countries at an early period such information as they possessed: for in Germany proper, surgery was still in a very languishing condition. These two universities formed the distributing reservoirs, from which the improved surgery (as at a later period the reformed midwifery) spread itself throughout Germany. The city first mentioned could show in

Hans von Gersdorff (about 1517), called Schylhans, of Silesia, a surgeon of advanced views, whose "Feldtbuch der Wundt Artzney sampt des Menchen Anatomy, vnnd chirurgischen Instrumenten, wahrhafftig abconterfeyt vnd beschrieben", Strassburg,[1] 1517 (with 25 woodcuts by Hans Waechtlin, surnamed Pilgrim) describes and depicts even major operations. In amputations ("to cut off an arm or a bone requires a certain amount of skill"! Gersdorff had cut off 100–200, and ought to be a judge) the incision was made, for the sake of safety, between two bandages bound around the limb, "for this cut is very sure, and comes out even." After sawing through the bone a (propulsive) bandage forces the soft parts over the bone, so that this is covered. The day preceding the operation the patient should receive the Holy Sacrament, and the surgeon himself should hear mass. He rejects narcosis with opium etc., because the patients become irrational. The bandage is applied without sutures, and the bleeding is checked by a caustic plaster or by the hot iron. Fractures, dislocations, cancer, fistulæ etc. and gunshot wounds are noticed, and the latter are still burned with hot oil, in order that the powder and the gangrenous tissue may be removed in the best and neatest way. He describes a trivalvular speculum to open the genitalia muliebria and the anus.

Gregorius Flüguss (also Fleugaus, about 1518), also of Strassburg, is of little importance.

Felix Wuertz (1518–1575) of Basle, distinguished for his honesty and originality, his faculty of observation, his freedom from prejudice, his lack of faith in authority (all qualities manifestly forged of the metal, and upon the anvil of Paracelsus) and his great experience, is one of the best German surgeons. His "Practica der Wundartzney", a little handbook, as he calls it, for times of war and peace, written in a lively style, treats of the abuse of stitches, styptics, bandages, tents and plasters, of wounds and fractures, of salves etc., to which is "appended" a useful little book on children (by his son Rudolph), directed against the abuses of midwives and children's nurses — so that the whole, in its very title, implies in not too mild a way the abandonment of the old paths. All surgeons, he says, must give place to Theophrastus von Hohenheim, and it has quite the tone of Paracelsus when he speaks of the "old song and dance", which must be abandoned, and asserts that "nothing, however, is older than nature". With Theophrastus von Hohenheim too, Wuertz is earnest in his opposition to stitching, probing, bleeding to check hæmorrhage, poultices in fresh wounds, burning for hæmorrhage, charms and "Characteres" or spells, as well as against cramming wounds with rags and clouts (as "Quellmeissel"), the so-called tents: "Medicine is what belongs in the wounds, and not such clouts". "They make use of clouts and rags and other things in their balsam, oil or salve, and forcibly stuff such things down between the sutures of the wounds. Thus they wipe out the wounds just as a gunner cleanses his barrel after making a shot." Upon the diet of the wounded also, Wuertz, with Theophrastus von Hohenheim, laid great stress: "Hold him as a woman in childbed!" In gunshot wounds he no longer follows the method of Gersdoff, and censures the maltreatment of such wounds with instruments and fillets drawn through them, while he also speaks against the checking of bleeding by caustics and the hot iron. Penetrating wounds of the chest he carefully closes by a suture, and discards trepanning, a course in which he shows himself the forerunner of a long line of eminent surgeons of the 18th and 19th centuries, Desault, Dieffenbach, Stromeyer etc. Like these he prefers to leave depressions of the skull to the healing powers of nature. Foul-smelling pus he regards everywhere of evil omen as regards the course of wounds. Fractures he treats with splints, and not with the earlier and customary barbarous extending machines, while he distinguishes "concealed fractures" (fissures etc.) from those of the ordinary kind. He is acquainted with traumatic fever, pyæmia and the diphtheria of wounds, is the first to perform amputation of the thigh, and one of the earliest surgeons to insist upon healing by first intention, which he declares possible only before the entrance of air. Finally Wuertz insists upon a knowledge of anatomy as thoroughly necessary for the surgeon! "A surgeon should know the structure of the skeleton, the muscles and the chief nerves and vessels, so that when he looks at a wound he may at once recognize what organs are wounded, and not need first to rake and poke with the probe. Ignorance of anatomy is to blame for so many crooked fractures.[1]"

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[1] Strassburg at this time was likewise the headquarters of the art of wood-cutting and of book-publishing.

The German-Belgian Vesalius and Ryff must also be mentioned as surgeons of importance. The former wrote a "Chirurgia Magna."

c. Midwifery and Gynæcology.

The labors in this department were intended for surgeons and midwives, and were, on the whole, mere reproductions of old material. Midwifery, including its operative branch, lay entirely in the hands of the midwives, and, as a rule, the empirics or ordinary surgeons, as well as the better surgeons, where such existed, operated simply in the worst cases (where they could not become expert), or rather massacred with them, or better after their style. This was the case in Rheinhesse too even as late as 1848.

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1. Among the Swiss surgeons of that day a brisk scientific activity must have prevailed. Jacob Buwmann, a surgeon at Zürich, published an anatomy written in German and adorned with 38 plates, after sketches by Albrecht Dürer, 1575.

“Der swangeren Frawen und Hebammen Rosengarten”[1] of Eucharius Roesslin[2] (called also Rhodion, died 1526) the Elder, a physician of Worms-on-the-Rhine and Frankfort-on-the-Main, was written in the style of the Greek and Arabian physicians and Albertus Magnus.

This work is more important as the first separate treatise on midwifery in the German language (written principally too for midwives and women), than for its contents, which relate chiefly to medical midwifery.[3] Still it also discusses some of the manipulations of the art, together with instruments, the treatment of childbed, the diseases of children etc., and the fœtal positions (face presentations are mentioned!) some of which are constructed entirely from fancy. Among the operative procedures even podalic version in breech presentations, definitely and precisely marked, finds place, so that Rosslin here anticipated Paré, though he in general still gives preference to version by the head. When the child is dead, he recommends the induction of premature delivery. This charming “Rosengarten” contains little, indeed, yet quite enough, of the truly horrible doctrines of operative midwifery in that day, and which continued in vogue for a long time thereafter. In spite of Christianity the parturient woman had not yet attained sufficient importance to claim the notice and aid of the highly educated physicians! In this “Garden of Roses” too there is occasionally a stronger odor of blood, fumigations with doves'-dung, hawks'-dung etc. than of roses! Perhaps the title may have sprung from the “Rosengarten” near Worms, well-known from the Nibelungen, and which still bears the same name to-day. The book, in spite of its semi-popular design and plan and its lack of independence in many things, was a pioneer work in its day, and was translated into all the languages of the time.[4] It should, however, be mentioned that it recommends mothers to nurse their own children, and gives a good description of puerperal diseases, the eye-diseases of children etc. A similar but much less valuable work, “De uteris, de pariente et partu liber”, was published by

J. VAN DE MEERSCHE (Jason a Pratis, 1487–1558).

Another “Frawen-Rosengarten” was written by

WALTHER HERMANN RYFF (Reiff, about 1545),

a physician and surgeon of Strassburg, and a writer of text-books on the subjects of distilling, anatomy and surgery, which display some originality. In his “Die deutsche Chirurgie”, 1559, he mentions the ligation of arteries with a silk thread, in the arm above, in the neck below, the wound.

“Ein schon lustig Trostbüchle von den empfangknüssen und geburten der Menschen” etc., designed for midwives, had for its author the surgeon and astronomical, political, historical and dramatic writer of Zürich,

JACOB RUEFF (died 1558).

In this work smooth and toothed forceps for the extraction of dead fœtuses are given. The author recommends cephalic, in addition to podalic version, and, like Paré, gives an account of terrific monsters.

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1. Argentine edition, Martinus Flach, junior. Dnica letare anno 1513, correctore Adelpho physico.
2. Doctor, as he expressly calls himself, and as he is designated in the “Privilegium” of the emperor Maximilian, bearing date Sept. 1512.
3. It is dedicated to the dutchess Catherine of Saxony, Brunswick and Lüneberg, and is adorned with good woodcuts.
4. In England it was translated, under the title of “The Byrthe of Mankyndé” (London, 1565), by a Dr. Raynalde. (H.)

The belief in the influence of the devil upon pregnant and lying-in women was still so great, that it was a common opinion that he often substituted "changelings" for the natural children, and Luther, with all his intellectual power, declared that these changelings could be distinguished by their loud cries, fæcal evacuations (Scheissen!) etc. Monsters originated from the sins of their parents etc. In cephalic version the author gives the following directions: "Die kindend frouw (soll) durch die Hebamm zu dem Bett verordnet und gelegt werde mit dem houpt nider und dem Arss hoher. Die Hebamm aber sol vor der frouwen sitzen, sie warten, wysen, leiten, schyben und bucken, das kind mit beeden schenckeln sampt dem ärssle hinder oder ob sich gegen der frouwen rugken schyben, damit es, mit dem höuptlein umbkeert mit rechter burt werden könne." (Schröder.)

Ludovicus Bonaciolus (Buonaccioli, about 1540), a professor in Ferrara, discusses natural pregnancy and parturition, and believes that a woman could bring forth as many as 150 children — too small a number, at least if we count all the ova which perish without bearing fruit. Other handbooks for midwives, some of which were purely gynæcological in their contents, were written by:

Nicol. Rocheus (about 1542), a physician of Paris;

Matth. Cornax (about 1550), a professor in Vienna;

Ant. Maria Venusti (about 1562): the versatile

Fabricius ab Aquapendente, who fixed the duration of involution at fifteen days;

Realdo Columbo;

Thaddæus Dunus, author of "Muliebrium morborum omnis genesis, remedia etc.", Strassburg, 1565.

Scipio Mercurio (Geron. Mercurii, died 1602) of Rome, a surgeon and Dominican monk (La commare o raccoglitrice);

Adam Lonicerus (1528–1586), city-physician of Frankfort;

Ambrosius Papen (about 1580);

Joh. Wittich (1537–1596) of Weimar, ordinary physician in Arnstadt;

David Herlicius (1557–1636);

Bald. Ronsseus (about 1597);

Martin Akakia, professor at Paris (1539–1588);

Gervais de la Touche (about 1587), and

Louise Bourgeois (Boursier, born 1564), who was educated in Paré's school for midwives in the Hôtel-Dieu.

The Diseases of Children were separately treated, as we have seen, as early as the close of the Middle Ages. During the course of the 16th century this subject was also discussed by Lobera d' Avila (1551); Hieron. Mercurialis (1583); P. Seb. Michelburg (Seb. Austrius, 1540), even in a popular style, as in "Ein Regiment der Gesundheit für die jungen Kinder" etc., Frankfort, 1549; Quirinus Apollinaris, a new Albertus Magnus ("von Weibern" etc., 1549); Æmil. Vezosius of Arezzo discussed fecundation, pregnancy and parturition in hexameter verse (1598). [To these we may add Leonello Vettori (Victorius, Leonellus Faventinus, died 1520), a professor in Bologna, and author of "De ægritudinibus infantum tractatus" (Ingolstadt, 1544); Thomas Phayer, whose "Regiment of life, whereunto is added a treatise on pestilence and a book of children" (London, 1544), has been already mentioned; and Michele Colombo, a pupil, and commentator upon the writings, of Mercuriali. (De morbis puerorum, Venice, 1600). H.]

4. THE REFORM OF NORMAL, AND SIMULTANEOUS FOUNDATION OF PATHOLOGICAL ANATOMY. THE FOUNDING OF PHYSIOLOGY.

Mondino had already made a beginning in the erection of the science of anatomy on the basis of the examination of the human cadaver, but the structure, as we have seen, was pushed forward only very slowly after his day. It was not until the 16th century that it advanced rapidly and became independent, through the refutation of, and its emancipation from the doctrines of Galen. In this work Vesalius took the lead of all others. Through his exertions was effected that which we may properly call the reform of anatomy, and thus too the preparatory excavations were made for the foundations of pathological anatomy and physiology.

At first serious errors, handed down from Antiquity, proved genuine hindrances to a far grander advancement. Such was the Galenic doctrine that the arteries, since they were empty in the cadaver, contained only the vital spirits, and that the veins alone contained blood; that the blood flowed forwards in the veins during inspiration and backwards in expiration, without returning to the heart, and was entirely consumed in the processes of nutrition. United to this was the further error that the blood and the *calidum innatum* oozed through the septum ventriculorum from the right to the left half of the heart. Moreover large pore-shaped anastomoses between the veins (as well as between the arteries) were everywhere sought, and, in spite of the discovery of the valves of the veins and the detection of the impermeability of the septum, in spite too of the removal of the erroneous opinion that the veins took their origin from the liver, anatomists were unable to free themselves from the old ideas. Thus only the *IDEA* of the lesser circulation was discovered. The vital spirits were still supposed to flow through the arteries into the body, that is into the veins and the brain, where the animal spirits were separated. (Compare Galen and Ancient Medicine in General.)

a. Anatomy,

inasmuch as it was for the most part entirely uncultivated, as well as largely falsified by inferences drawn from the anatomy of the lower animals, furnished a fruitful, as well as suitable, field for the acquisition of medical facts, the creation of medical principles, and for numerous discoveries. These were heaped together in a proportion utterly impossible at a later period. Human anatomy owed the active culture which it received in Italy during the 16th century, as in the Alexandrian period, to the fancy of contemporary princes, including the popes. Without their patronage the human bodies necessary for its prosecution would not have been accessible. Wherever these were wanting, as in Germany etc., anatomy remained in a languishing condition, even as late as the threshold of the present century. From the necessary comparison of Galenic[1] (or animal) anatomy with the new human anatomy, in order to refute the former and to separate it from the latter, a beginning of the later science of comparative anatomy was likewise made.

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[1] Versalius was the first to declare that Galen's anatomy was based upon the dissection of the lower animals.

The eminent pioneer of anatomy and the positive tendency in general of all the new medical science was the ingenious, indefatigable, dauntless, inspired and self-sacrificing German-Belgian investigator,

ANDREAS VESALIUS (born Dec. 31, 1514, died Oct. 2, 1564) of Brussels.

He it was who first, and for a long period alone, boldly and persistently combated by facts, and not (like Theophrastus von Hohenheim) by speculations, the popular reverence for the authority of Galen's animal anatomy, eradicated it, if not among all his contemporaries, at least for the future, and thereby placed observation in possession of its rights. In this task he was the first to employ wood-cuts drawn after nature in illustration of his anatomical works,[1] and thus to furnish a good substitute for direct personal inspection to those who could not themselves make dissections, a class whose number, for reasons easily conceivable, was at that period very large. Fortunately Joh. Stephan von Calcar (Kalker), a pupil of Titian and an excellent artist, was at his command, and the name of this artist has been particularly immortalized by the plates of Vesalius.

Almost everywhere Vesalius placed himself in express opposition to Galen. Thus he denied the existence of the os intermaxillare in adults, and the composition of the inferior maxilla of two bones. In like manner he reduced Galen's seven bones of the sternum to three, and gave to the sacrum (and coccyx) five or six pieces, instead of the three of Galen. In opposition to the latter Vesalius also established the existence of marrow in the bones of the hand,[2] and refuted his assumption of an imputrescible bone of the heart, as well as his assertion of the strong curvature of the bones of the upper arm and the thigh. He maintained that nerves and muscles stood in no relation of proportionate strength to each other, for that stout nerves were distributed to small muscles, and conversely; that the tendons were similar in constitution to the ligaments and not to the muscles, that the latter were in some respects independent. Vesalius denied the existence of a general muscle of the skin, proved that the intercostal muscles merely separate the ribs from each other, without either expanding or contracting the thorax; discarded the origin of the vena cava inferior from the liver, the assumption of cotyledons in the human female, the separation of the bones of the symphysis during parturition etc. — all in opposition to Galen. He first described the course of the vena azygos and the subclavian vein, the ductus venosus, the absence of the rete mirabile in the brain, the five cerebral ventricles and the non-glandular character of the caruncles; gave a description of the vestibule of the ear and the long process of the malleus, the tensor tympani muscle, the labyrinth. the sphenoid bone, the mediastinum, the peritoneum and omentum. the cardia and pylorus, the fornix and septum pellucidum, the movements of the brain etc. etc. — proof enough that he overturned the old anatomy in all points, replaced it with a new science, and added even to the latter new discoveries! Of course Vesalius was no more exempt than any other man from individual errors, and those of his own, and the past, age! Thus in his view the veins alone were bloodvessels, while the arteries were still carriers of the vital spirits and simply appendages of the veins. In like manner he still assumed originally the existence of pores in the septum ventriculorum, and it was not until 1543 or 1555 that, under the lead of other anatomists, he gave up this idea. These are all mere shadows. necessary to the brilliancy of the picture!

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[1] These were: "De corporis humani fabrica libri septem", Basil, 1543; and "Suorum de fabrica corporis humani librorum epitome", Basil, 1543. In defence of these works he also wrote: "Gabr. Cunei Mediolanensis apologiæ Franc. Putei pro Galeni anatome examen", Venet., 1564, and "Anatomicarum Gabrielis Falloppii observationum examen", Venet. 1564. (H.)

[2] Sylvius meets this fact by styling its discoverer "Vesanus" (one of the amenities of controversial literature in that day), and assuming that the bones of the hand were differently constructed in the days of Galen! (H.)

Vesalius had the extremely rare fortune to find favorable conditions for the perfection and realization of his great endowments as an anatomist and physician in his family and in his age. He was also fortunate enough to strike upon a subject almost entirely unworked and readily accessible to the senses. Scion of a family of physicians — his great great-grandfather. Peter of Wesel on the Rhine, had been a physician, his great grandfather. Johann von Wessele (who subsequently immigrated as a professor to Louvain, for which reason the family came to Belgium and changed its name), was physician to the emperor Maximilian, his grandfather (Eberhard) again was a physician — he himself was also the son of the apothecary of a relative of Charles V., whose attention was thus directed to him. In addition to all these fortunate circumstances, he was able to attend the best schools, at a time when anatomy was, so to speak, in the very air! He was never lacking in assiduity, zeal and strength of character, qualities which. in contrast to the certainly rare favors of fortune already mentioned, redounded to his credit! His primary education he received in Louvain. Subsequently he was able to go to Montpellier and Paris, where the anatomist Guido Guidi (Vidus Vidius, died 1569) of Florence, the friend of Benvenuto Cellini, with whom he lived for a long time in Paris, and the restless Winther. (Günther) of Andernach on the Rhine, both at this period residing in Paris, were his teachers. Jacob. Sylvius (Dubois, died 1555). the famous practical anatomist (discoverer of the fissure and acqueduct of Sylvius, the muscles of the calf of the leg. the panniculus etc.), who gave names to the vessels and muscles and suggested the injection of the vessels, was also one of his teachers. The most famous of his fellow students under Sylvius was Servetus. Sylvius, however, as is often the case with teachers and pupils, in his efforts to uphold the ancient Galen, became afterwards the chief of Vesalius's opponents. With the object of defending Galen he asserted that the perfectly straight thigh bones, which, as every one saw, were not curved in accordance with the teachings of Galen, were the result of the narrow trowsers of his contemporaries, and that they must have been curved in their natural condition, when uninterfered with by art! In Paris, at this time animal dissections exclusively were practised, and it was only after his return home — in his 20th year — to Louvain that Vesalius was able, at considerable risk to himself, to steal a human skeleton from the gallows. Soon after he entered the military service as surgeon, a position which, by the investigation of dead bodies, he made fruitful in the attainment of the object of his life. At the age of 23 years he became professor of anatomy at Padua, where at first he lectured in accordance with the doctrines of Galen, but subsequently independently of these. Vesalius also taught in Pisa and Bologna at this period when he wrote his chief work. In the year 1543 he was called to Belgium as physician of the emperor Charles V., and in this position he came also to Germany.

As soon as his book made its appearance it awakened opposition everywhere. In the front rank of his opponents was the professor of anatomy at Rome.

Bartolommeo Eustacchi (died 1574),
the discoverer of the Eustachian tube (1562; he regarded it as adapted to conduct pus etc. out of the ear, and to receive medicines), the stapes, the modiolus of the cochlea, the membranous cochlea, the tensor tympani muscle, the origin of the optic nerves, the sixth cerebral nerves, and the supra-renal capsules. He described the muscles of the throat and neck, the thoracic duct, the four pulmonary veins, the uterus etc., and prepared some anatomical plates, famous for their artistic perfection, which were first found and published by Lancisi in the 18th century. With him were united in their opposition to Vesalius:

Franciscus Puteus (about 1562) of Vercelli, and

Joh. Dryander (Eichmann, died 1560) of the Wetteraw,
professor in Marburg, but a man of little importance (Anatomiæ pars prior etc., Marburg, 1537):

Matteo Realdo Colombo (born 1490 ?, died 1559) of Cremona,
a pupil and prosector of Vesalius. He described the duplicatures of the peritoneum, the ventricles of the larynx, the terminations of the nerves in the muscles, the musculus omohyoideus, the thyroid gland and its increased size in women, which produced a fullness of their necks (Fuhr) etc. Subsequently he was the successor of Vesalius at Padua, but most ungrateful to his master. Colombo was an especially good osteologist, and likewise an excellent practical obstetrician, the first who combated the doctrine of the *culbute*. He likewise was the first who demonstrated experimentally that the blood passed from the lungs into the pulmonary veins. That it pushed on further into the left ventricle, thus establishing the lesser circulation from one side of the heart to the other, this he did not expressly teach, but it was reserved for Harvey. Servet as well as Colombo could not get rid of the idea of the "spiritus", and thus both had only approximations to the correct idea of the lesser circulation. Harvey was the first who recognized this as a pure circulation of blood. Colombo bears the responsibility of having been the first person to perform vivisection upon dogs instead of hogs, for the reason that the latter were annoying by their squealing. On the other hand, however, there appeared as partisans of Vesalius,

Giov. Filippo Ingrassias (1510–1580) of Recalbuto in Sicily,
professor at Naples, the most accurate osteologist of his age, and one of the best myologists;

Giambattista Canano (1515–1579),

a professor at Ferrara, and ordinary physician of the duke of that city, who described first in 1546 the valves of the veins (though, according to Landois, they were already known to Theodoret, bishop of Syria), and also gave a very accurate description of the muscles of the upper extremities. The latter physician, however, did not enter very energetically into the contest.

As the fame of Vesalius increased, so also did the opposition to his work, and accordingly Charles V. requested the Faculty of Salamanca to examine into the orthodoxy of the book. Here again that enlightened body rendered their decision in the interests of persecuted science (1556). Vesalius, however, weary with the opposition encountered in Italy, returned to his home, and thence went to Basel (he left here a skeleton which is still preserved). The latter change was made partly in the interests of a new edition of his book, partly to deliver lectures in that city. Finally Philip II. called the wandering investigator to Madrid as his physician. But here again he suffered renewed persecutions, especially from the priests, who saw clearly that a portion of the light with which Vesalius was illumining the body must also fall upon the belief in immortality and the resurrection, and that the latter would thus finally be broken into fragments. It is also said that during the dissection of a Spanish woman signs of life were still observed, or according to another version of the story, as Vesalius was dissecting the mistress of a priest he discovered some disagreeable results of priestly potency; perhaps the latter circumstance may have given origin to the former calumnious story. However this may be, this much-persecuted, irritable and impetuous, rather than good and discreet, reformer and champion of the truth, in a fit of ill-humor, undertook a pilgrimage to Jerusalem. He came near losing his life by shipwreck, and died on his return, upon the island of Zante, of a disease contracted through the accident, to which he had been exposed, and just at the time when he was honorably recalled to Padua as a professor.

We may consider as a predecessor of Vesalius the already mentioned

Giacomo Berengario of Carpi,

who was a professor at Bologna from 1502 to 1527, in which latter year he withdrew to Ferrara banished, as it would seem, by the justifiable hatred of the Bolognese. He first dissected swine, and then numerous human bodies, and also defended (and his enemies said practised) vivisections and pederasty[1] upon convicts. He was the first to describe the os basilare and the sinus sphenoidei, the latter of which he considered the source of catarrh; the membrana tympani, concerning the origin of which whether from the auditory nerves, or from the meninges, he however remained in doubt. He also described inexactly the muscles of the eye, the cerebral ventricles, the choroid plexus, the pineal gland, the connexion of the ventricles with the canal of the spinal cord, the absence of nerve-roots in the cerebellum, the spinal cord and cervical nerves, the puncta lachrymalia, cæcum, vermiform appendix etc. He also taught that there were *no pores in the septum ventriculorum*, that the veins and arteries possessed valves at the heart, and that valves also existed between the auricles and ventricles of that organ. By the injection into the veins of fluids which made their appearance upon the papillæ, he settled the question whether the kidneys were simple organs of urination, and cleared up the course of the abdominal veins.

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[1] This crime, in consequence of the unexampled immoralty which prevailed in Italy at this time and still later, was by no means uncommon. There were even books upon all sorts of possible and improper varieties of sexual intercourse.

Among his contemporaries the following were anatomists of importance:

Nicolaus Massa (1499–1569),

a physician of Venice, who, in his "Liber introductorius anatomiæ" etc., 1536, described many things, including the muscles of the face and submental region, the position of the stomach, the lymphatics of the kidneys, the accessaries of the female sexual organs, and the choroid plexuses, in which latter he sought for the soul. He also discovered much that was new, and corrected some of the old ideas, e. g. the relations of the bladder, the abdominal muscles, the scrotum, the lung-tissues, the first pair of nerves etc. (Sigm. Purjesz, sen.). He likewise described Cæsarean section.

Andreas Laguna (died 1560) of Segovia.

The following physicians continued mainly followers of Galen: Loys Vassé (Latinized Vassæus; the French form Levasseur is incorrect, as well as the conversion of Loys into Ludovicus. It should be properly Lodoicus) of Châlons-sur Marne, (Compendium of anatomy,[1] 1553, with anatomical plates);

Charles Estienne (Stephanus, 1503–1564) of Paris,

a pupil of Sylvius, and a man of liberal ideas (he was arrested for heresy and died in prison), who, in an illustrated work, gave his own views on desmology, chondrology and osteology, and described the differences between the white and gray matter of the brain, between venous and arterial blood, and the phrenic nerve; and

Guillaume Rondelet, who has been already mentioned.

The most important anatomist after Vesalius (whose pupil he had been), equally distinguished as a man and as a savant by his sense of justice, his modesty and his gentleness, was

Gabriele Falloppio (Fallopia, Falloppia, Fallopio, Fallopius, 1523–1562) of Modena.

He had studied in Padua, and visited Greece and France. At the age of twenty-four he was appointed professor at Ferrara, and subsequently filled the same position at Paris, and finally in Padua. The fact that even Falloppio did not shrink from accepting the gift of some convicts, and then poisoning them — indeed, when the first experiment proved a failure, he tried it again with better success — is characteristic of the zeal of the age in the investigation of the human body, and of the barbarous idea that might makes right towards those guilty before the law!

Of his numerous discoveries and descriptions we mention those of the aquæductus vestibuli, the foramen ovale, the lamina spiralis of the cochlea, the chorda tympani, his naming of the membrana tympani; of the petrosal and sphenoidal sinuses (he demonstrated the absence of the latter in the fœtus, as well as the fact that the fœtal sternum consists of seven bones, and the fœtal lower jaw of two bones); of the muscles of the forehead, occiput and tongue; the three scaleni; the obliqui abdominis; the so-called Poupart's ligament; the so-called valvula Bauhini; the seminal vesicles hymen, clitoris, ovaries, ovarian tubes in the human female[1] (Rufus of Ephesus had seen them in sheep), round ligaments; the lymphatic vessels; trigeminus, acoustic and glosso-pharyngeal-nerves, nervous ganglia etc. He showed that the membranes of the brain have no part in the origin of nerves etc. Falloppio was a man of great versatility, and a practical surgeon and author. He wrote even on medicinal springs syphilis (he recommended condoms of linen, and was an anti-mercurialist) and other subjects.

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[1] Eloy gives the full title of this work "Ludovici Vassæi Catalaunensis in Anatomen corporis humani Tabulæ quatuor", Lutetiæ, 1540. The question of its authorship is disputed. Some authorities ascribe it to Loys Vassé, a native of Catalonia, and pupil of Sylvius; others to Jean Vasses (Vassæus) of Meaux in Brie, dean of the Faculty of Paris in 1532 and an eminent Hippocratist. Eloy says if the author was born in Catalonia he should be called "Catalanus", instead of "Catalaunensis", which means a native of Châlons-sur-Marne. (H.)

A pupil of Falloppio was the Dutchman

VOLCHER KOYTER (1534–1600) of Gröningen,

who, after serving as a military surgeon, settled in Nuremberg. He described the facial canal, the labyrinth, muscles of the eye-brows, and was the first to describe two anterior and two posterior spinal nerve-roots etc. Other renowned anatomists of that day were:

HIERONYMUS FABRICIUS AB AQUAPENDENTE (1537–1619),

the very eminent teacher of Harvey (who owed much to his suggestions — the greatest praise probably which could be given him), a pupil and successor of Falloppio, who won deserved credit by his teachings regarding the valves of the veins, and his studies in the history of development and in comparative anatomy. How carefully he observed may be judged from the fact that he knew the cavity of the tympanum in the new-born was filled with mucus, a fact rediscovered in our day.

COSTANZO VAROLIO (1543–1575),

professor at Bologna, ordinary physlcian of the pope, who described the pons, commissure, crus cerebri, and the nervous system in general:

GIUL. CESARE ARANZIO (1530–1589),

professor at Bologna and a pupil of Maggi, who also studied the nervous system and described the pes hippocampi. He likewise discovered the levator palpebræ superioris and coraco-brachialis muscles, the foramen ovale, ductus arteriosus, corpora Arantii etc., and was acquainted with the contracted pelvis as the chief cause of difficult labor, and the muscular nature of the uterus, before Fabricius, to whom a knowledge of these facts is usually ascribed.

CÆSALPINO,

whom the Italians desired[2] to stamp as the discoverer of the complete circulation (he is said to have been the first to employ the term circulatio), although he still assumed that only a portion of the blood passed through the lungs, another part passing through the pores in the left ventricle. However we must grant that, of all the predecessors of Harvey, he came nearest to the doctrine of the complete circulation, and especially that he supplied the data of the greater circulation. Yet he was far from closing the double circle formed by the complete circulation.

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[1] Falloppio demonstrated that they opened into the abdominal cavity and were not connected with the so-called female testicles. The latter too he did not consider organs for the elaboration of semen, which, according to his view, was prepared by the blood.

[2] The professors Mazziorani and Guido Baccelli of Rome attempted the same thing in 1876, and even erected a monument to his memory as the discoverer of the circulation of the blood.

Giul. Casserio (1561–1616),
professor at Padua, a teacher of Harvey, and discoverer of the muscles of the ossicles of the ear;

Eustachio Rudio (died 1611),
mentioned also in the doctrine of the circulation;

Archangelo Piccoluomini of Ferrara (died 1605. Described the linea alba):

Carcano Leone (1536–1606);

Andr. du Laurens (1558–1609) of Arles,
chancellor of Montpellier and subsequently of Paris, physician-in-ordinary of Henry IV., who wrote a famous "Historia anatomica humani corporis", which takes Galen under its protection and contains little that is original. He is devoted to mysticism and unworthy of belief. He declares, however, that the king had cured 1500 scrofulous persons by laying his hands upon them.

Abraham Thorer (1489–1550) of Basel;

Walther Ryff, who wrote in 1541 the first anatomy in the German language;

Salomon Alberti (1540–1600), professor at Wittenberg;

Felix Platter (1536–1614), discovered the ampullæ and expressed his opinion as to the stronger curvature of the posterior surface of the lens;

Caspar Bauhin (1550–1624), professor at Basel;

Pieter Paan (1564–1617) of Amsterdam;
the famous ordinary physician of the Palatinate, selfsufficient gossip and insignificant anatomist

Joh. Posthius (1437-1597), of Germersheim in the Palatinate;
described the milk-ducts in 1590;

Leonhard Fuchs,
who deserves special credit for diffusing the doctrines of Vesalius;

J. Bockl (about 1585);

Thomas Vicary,[1]
the first surgeon of St. Bartholomew's Hospital, who wrote in 1548 the first English work on anatomy, in which he follows the Ancients, especially Galen;

Thomas Gemini,[2]
who published in London in 1559 a "Treatyse of Anatomie" with 39 copper-plates, the first anatomical work so illustrated in England;

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1. Thomas Vicary has been mentioned before p. 336, in connection with the chartering of the guild of barber-surgeons in 1512. His book was entitled "The Englishman's treasure, or the true Anatomy of man's body", London, 1548, 1577, in 8vo., 1587, 1633 in 4to. According to Mangetus, Douglas and other authorities, an anatomy of the human body in two books was written by William Horman of Salisbury, an Englishman who died in 1535. The title of this work, when and where it was published, in what language it was written and whether Horman himself was a physician are all unknown to the translator. (H.)

2. According to Eloy, Thomas Gemini was a foreign artisan and skilful engraver who settled in London in the early part of the 16th century. He was the first who engraved the plates of Vesalius on copper, and, with the aid of some literary friends (he himself understood neither English, Latin nor anatomy), supplied them with the descriptions of their author and published them as of his own

Juan Valverde de Hamusco (about 1560) of Castilla la Viega in Spain, author of "Historia de la composicion del cuerpo humano", Roma, 1556, with 42 copper-plates.

b. Pathological Anatomy

in the 16th century won at least a beginning. This, however, was rather the result of the search for curiosities, so prevalent at that time, than the natural consequence of the active anatomical zeal of the age, or of any investigations having directly in view the development of pathological knowledge and the advancement of practice. It too was chiefly employed in the refutation of the views of the ancient physicians, and thus, like almost everything else in the 16th century, acquired a reformative significance.

The human body was investigated particularly for stones and concretions. Stones of the kidney, bladder, lungs, gall-bladder, tongue, brain, etc. were found, and this fact worked against Galen, who admitted the existence of the first two varieties only. Here too it was a question of the observation of reformative facts in medicine, and Benivieni, Kenntmann, Dodoëns and Donatus were particularly active in the work. The possibility of the continuance of life with abscess etc. of the heart, which had been denied by Galen, was also demonstrated. Ulcers of the stomach, degeneration of the kidneys and hypertrophy of the bladder with simultaneous ulceration of the urethra resulting from gonorrhœa, hydrometra and other pathological lesions were observed by Dodoëns, who has been already mentioned. More extensive advances in pathological anatomy were made by Schenck von Grafenberg (who published the first case of cystic mole) and Felix Platter, "who in 51 years dissected 300 bodies, was the teacher of all Europe and yet left to posterity not one single truth" (Rohlfs), a fate which he shared with many others, for it is not every one who can find truths. Of special distinction in this department were Guillaume Baillou (Ballonius), Foreest, Fernel and others. Koyter's observations on the changes observed in the brain and spinal cord after delirium, convulsions and paralysis, are surprising for their delicacy.

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designing. The first edition was published under the Latin title "Compendiosa totius Anatomiæ delineatio ære exarata", London 1545, in folio. English editions also appeared in 1553 and 1559.

John Hall, an English surgeon, also published in 1565 a quarto volume containing a translation of Lanfranc's "Chirurgia parva", a handbook of anatomy, entitled "Very frutefull and necessary briefe worke of anatomie", and an "Historical expostulation against the beastlye abuters both of chyrurgerie and physicke in oure tyme". The book was dedicated to the Company of Surgeons, and the author states that the "Chirurgia parva" had been already translated from the French into Anglo-Saxon some 200 years before, and that his own translation was merely the conversion of this Anglo-Saxon work into modern English.

The English surgeon John Banister, who has been already mentioned, should also be noticed here for his "The history of man sucked from the sappe of the most approved anatomists of this present age etc.", London, 1578. (H.)

too acquired incidentally from the labors of the anatomists much additional knowledge regarding the action of the muscles. Thus Falloppio proved that the transverse fibres do not always preside over expulsion and the oblique fibres over retention, as Galen declared, but that both functions might be performed by fibres of a different direction, while Vesalius demonstrated that longitudinal division of a muscle did not deprive it of contractility. With regard to the internal and external intercostal muscles, Vesalius held that both sets merely approximated the ribs, while Galen believed that the external intercostals contracted the thoracic cavity, and were therefore expiratory muscles, while the internal intercostals, by enlarging the cavity of the thorax, were active in effecting inspiration. At the present day we hold conversely the external intercostals to be muscles of inspiration, the internal, muscles of expiration. Most of the muscles too were tested as to their action, and, wherever necessary, the views of the Ancients on this subject were rectified. In the prosecution of this work, besides the physicians who names have been already mentioned, all those who held to modern views, and a part too of the partisans of Antiquity, took a share.

The investigations concerning the use of the valves found in the heart and the veins, and the impervious septum ventriculorum, led to a very active discussion of the circulation of the blood. Serveto, a pupil of Dubois in anatomy, was the first to teach the imperviousness of the septum, and concluded that the blood (inasmuch as more of it went to the lungs, through the large pulmonary arteries, than was required for their nutrition), after thorough intermixture with the pneuma in the lungs—an intermixture which could not take place in either of the ventricles in consequence of their diminutive size — returned again to the heart by way of the pulmonary veins. That the blood mixed with the pneuma returned to the heart, formed, therefore, the only obscure point in Serveto's idea of the lesser circulation. This, six years later, was removed by Colombo, who demonstrated experimentally that the pulmonary veins contained blood alone. Cæsalpino, a pupil of Colombo, came still nearer the truth, since he explained the lesser circulation perfectly correctly, even spoke of anastomoses between the arteries and veins in the lungs, and did not teach that the blood became intermixed with the pneuma in the latter organs, but merely that it was cooled by the inspired air contained in the branches of the bronchi adjacent to the vessels. Yet he again admitted the existence of pores in the septum ventriculorum. He also sketched correctly the greater circulation, but is obscure in regard to the "spirits". "In animals we see the nutriment borne by the veins to the heart, as to the laboratory of the indwelling heat, and, having acquired here its final perfection, distributed by way of the arteries to the whole body by the working of the spirit, which is prepared from that aliment in the heart." He recognized the distention of veins behind a compressing bandage, though he was ignorant of the existence of valves in these vessels. — After the discovery of the foramen ovale in the septum of the auricles and of the ductus arteriosus and ductus venosus, the fœtal circulation was also frequently described correctly.[1]

Even experimental studies were made upon the mechanism of the secretion of urine, and the physiology of generation and of development— a subject naturally very popular since the days of antiquity down — was cleared up. The explanation of the latter subjects was based upon investigation of the genitalia, and the observation of incubated eggs and of human embryos. Even the physiology of the brain and spinal cord was somewhat advanced.

Jean Fernel (1485–1558), who, after having thoroughly studied philosophy and physiology in Paris, in the interest of his own health turned his attention to medicine, is regarded as the most memorable physiologist of this period. Fernel was a professor at Paris and, towards the close of his life, physician-in-ordinary to Henry II.

The seat of the soul, which Fernel considered a simple substance, regarding its individual faculties as simple functions, was located in the brain. The nerves of sensation he held to originate from the brain itself, those of motion from its membranes. Fernel considers the elements actual bodies, and assigns to them heat (the substratum of which is spiritus) as the animating principle. He thinks the blood originates in the liver, assigns semen and testicles to women as well as men, and holds correctly that the testicles of men do not escape through openings in the peritoneum, but follow this membrane as a prolongation — in the two former ideas following Galen, in the latter opposing him.

5. STATE MEDICINE AND PSYCHIATRY.

A few ordinances within the sphere of state medicine existed, as we have seen, even in the Middle Ages; indeed autopsies were made in cases of poisoning. This was the case particularly in the numerous free cities, which had been powerful aids in the promotion of general culture towards the close of the Middle Ages, and especially in Germany. The criminal ordinance[2] of Charles V., of the year 1530 or 1533 (an extension of the Bamberg ordinance of 1507), was, however, the first effort to determine definitely and connectedly the cases in which the judge should summon physicians or midwives as experts. Such cases were infanticide, mortal wounds, apoplexy, poisoning, concealed pregnancy and childbirth, abortion, the practice of medicine by incompetent persons etc. From this time forward the reciprocal action upon each other of medicine and jurisprudence became permanent, a fact which increased the estimation of medicine and physicians. In this ordinance of Charles V., however, judicial autopsies were still not directed. They were opposed by that superstition which was still so omnipotent, and the anatomical capacity required for dealing with such cases could not have been generally presupposed. Yet Paré made a judicial autopsy in 1562, and after this time post mortems for judicial purposes took place frequently. Haeusser criticises these most too severely: "Nothing can be more ridiculous than the medical opinions of that period, essaying to exhibit the facts and symptoms of a disease." Ordinances of medical police were issued in a few cities, e. g. one in Nuremberg in 1518, relating to the sale of food, popular amusements and adulteration of wine, a thing often done even in Antiquity.

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[1] For a more complete account of the gradual development of the true theory of the circulation, the reader is advised to consult Dr. J. C. Dalton's "Doctrines of the Circulation", (Phila. 1884), a work admirable both for its thoroughness and for the clear and interesting style in which the somewhat obscure subject is handled. (H.)

[2] Very mild for its day, but extremely barbarous in appearance to us of the 19th century, though, alas, it continued in force down to the present century. (Baas.)

The ordinance referred to in the text is the "Constitutio criminalis Carolina", an amplification of a similar ordinance published by George, bishop of Bamberg, in 1507. (H.)

Strict imperial ordinances against the "improvement" of wine by sugar of lead etc. were promulgated by the imperial diet in 1475, by the emperor Frederick III. in 1487 and by Maximilian in 1497. The penal ordinance of the criminal court directed its attention to the falsification of goods in a special section on "Fälscher mit Mass, Wag und Kaufmannschaft", and their example has been followed in the modern German Empire. Beer too was kept under supervision, though this and other industrial productions were chiefly controlled by the guilds. In Frankfort-on-the-Main there existed a long list of most judicious hygienic ordinances. The medical ordinance of 1577 directed: 1. "In order to improve the air the streets shall be cleaned Wednesday and Saturday of each week after the closing of the market; 2. The passing of urine on the streets is prohibited; 3. Privies shall be erected in all houses"—very many persons at that time must have sought some other convenient place; 4. "The knacker (Schinder) shall transact business only during cold weather (and in summer?)"; 5. "The shops of butchers, tanners, fishermen and furriers shall be removed etc. Hog-pens, goose-pens and wells shall be cleaned. During foggy weather no one should go out at night, and the mouth should be kept closed etc." (Stricker). Even the soul's welfare was a subject of anxiety, for piety is the fons omnis salutis. "Pest-ordinances" in great numbers were promulgated in Germany, Italy, Switzerland, France, England etc. In Italy, however, both these branches, towards the close of the 16th century, seem to have assumed an important position, for at this period lived Fortunatus Fidelis (Fedeli, 1550–1630), who wrote a special book entitled "De relationibus medicorum" etc., in which everything commonly reported upon by physicians in medico-legal cases is treated of at length. He regarded post mortem inspection as very important, but not always decisive. Joachim Strüppe, a physician of Gelnhausen, was the first in Germany to write on the subject of médical police in his work entitled

"Nützlichen Reformation zu guter Gesundheit und christlicher Ordnung", which appeared in 1573.

Psychiatry was yet in a very bad condition, for Jac. Sylvius remarks: "In some cases (of insanity) scolding is required, in others blows and shackles." In opposition to him F. Platter insists upon psychical treatment instead of incarceration. The maltreatment of the insane at this period, and which, indeed, in many places continued down to the present century, may be frankly compared with the trial of witches (for both agree in arising from religious superstition in demoniacal possession), only that with the witches shorter work was made, while the insane were imprisoned, sometimes as much as forty years.

They were chained up, left to wallow in their own filth, often naked, starving and tormented and beaten by inhuman jailors and keepers. Some died of cold in their very prisons. Platter divided mental disorders into four classes: mentis imbecillitas, defatigatio, consternatio and alienatio. Foreest also made some observations on mania and recognized lycanthropia.

How far, however, genius often outstrips its time is shown by the brilliant example of Shakespeare in his fictitious treatment of the insane king Lear. Shakespeare's son-in-law was a Dr. Hall,[1] but the dramatist could not have obtained his information from him, for in England too at this period the maltreatment of the insane was shameful, and so it continued for a long time. The harmless lunatics in London at that time wore a ring upon the left arm, had a large ox-horn suspended from their neck, and were compelled to support life by begging. ' [In Dr. Andrew Borde's "A Breviarie of Health", published in 1547, is a chapter entitled "An order and a dyett for them the whiche be madde and out of their wytte" in which he gives the following advice: "I do advertyse every man which is madde or lunatycke, or frantycke or demonyacke, to be kept in safegarde in some close house or chamber where there is lytell light: and that he have a keeper the whiche the madde man do feare." Yet Tuke says that many of Dr. Borde's suggestions as to the treatment of the insane were not unkind, however peculiar they may have been. The Hospital of St. Mary of Bethlehem for the insane, popularly known as "Bedlam", was founded as a monastery by Simon Fitz Mary in 1246, and converted into an insane asylum in 1547. Toward the close of the 16th century it was described as "so loathsome as to be unfit for any man to enter". (H.)

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[1] This Dr. John Hall was a man of considerable celebrity in Stratford-on-Avon and its vicinity. He wrote a work, entitled "Select Observations on English bodies, or cures both empericall and historicall, performed on very eminent persons in desperate diseases", which was published by Dr. James Cooke in 1657. The work contains the histories of nearly 200 cases of disease, and the editor in his preface says: "It seems the author had the happiness (if I may so stile it) to lead the way to that practice, almost generally used by the most knowing, of mixing scorbutics in most remedies." Indeed scurvy-grass figures in many of his prescriptions (Phila. Med. News, Aug. 1, 1885).

The following epitaph is said by the N. Y. Med. Record to appear upon a stone in the cemetery at Fredericksburg, Va.: "Here lies the body of Edward Heldon, Practitioner in Physics and Chirurgery. Born in Bedfordshire, England, in the year of our Lord 1542. Was contemporary with, and one of the pall-bearers of, William Shakespeare, of the Avon. After a brief illness his spirit ascended in the year of our Lord 1618 — aged 76." As Shakespeare did not die until April 1616, the margin of probability in the reported epitaph is small, though of course its truth is possible. (H.)

6. VETERINARY MEDICINE. PHARMACOLOGY.

Veterinary medicine in the 16th century enjoyed special advantages in the translation into the national tongues of the works of the ancient writers on this subject, and in the increased accessibility of these works resulting from the invention of printing. The anatomy of the horse was most advanced by independent observation. The veterinarian Francesco de la Reyna (1564), a Spaniard, and Claudio Corte (1562) made their appearance as veterinary writers. The physician Jean Ruelle (1474–1537), at the instance of Francis I., translated into Latin in 1530 the "Hippiater" of Constantine Porphyrogenitus, from which it was then translated into French by Jean Massé in 1563, and subsequently into German. A work of more importance, however, was the "Dell' anatomia e dell' infirmità del cavallo" (1598), published by Carlo Ruini (died 1590 ?), a senator of Bologna, a book which acquired great popularity in the following age. Ruini was, indeed, the creator of zootomy.

Pharmacology in this century was chiefly enlarged by a great number of metallic remedies, though some permanent enrichment of the science also occurred. The impulse to this advance was due chiefly to Theophrastus von Hohenheim and the advancing science of chemistry. Yet, in addition to the newly introduced mineral remedies, which continued to be of a very complex character, and to whose introduction great objections were also opposed, many old vegetable remedies were retained, so that e. g. in the Augsburg pharmacopœia nearly 700 of these old herbs were specified! The discovery of America speedily displayed its influence upon pharmacology. Among the newly introduced vegetable remedies must be mentioned the guaiac wood (1508, celebrated in verse by Ulrich von Hutten in 1517); China root (1525); sarsaparilla (1530). Pharmacognosy too contained many novelties. Thus e. g. a book of 1534 (according to Proksch) says of guaiac that it grows upon the Antilles, has a brown or black pith, its fruit and its nuts, which are good to eat but laxative etc.—Pharmacognosy, pharmaco-dynamics and pharmaceutics, and pharmacy also, to some extent, were contained in the "Kräuterbüchern" (herbals) of that day, e. g. in that of Eucharius Roesslin, junior (died 1553 or 1554) etc. The preparations of drugs were endlessly increased by essences, quintessences, specifics, tinctures, arcana, extracts etc., and really enriched by the use of mineral waters, though, in comparison with earlier times, pharmaceutical science was somewhat simplified. Yet under the head of "simple" remedies (a name used at this period in contradistinction to the endless composite remedies) some very complex mixtures were still included. Thus the above mentioned pharmacopœia of the year 1564 introduces among its simple remedies the following list:

Simplicia from the vegetable kingdom: leaves, flowers, fruits, juices, woods and barks. Simplicia from the animal kingdom: fat, marrow, bones and hair. Simplicia from the mineral kingdom: metals, stones, precious stones and earths. Simplicia from the kingdom of the sea and the waters: coral, salt, pearls, shell-fish etc. To be more specific, the following remedies, with numberless others, were mentioned in the different classes:

Emollient herbs	althæa, malva, acanthus;
Seeds, warm in the highest degree . . .	anise, fennel;
Seeds, warm in a lower degree	daucus, amomum;
Seeds, cold in a higher degree	cucumbers, melons;
Seeds, cold in a lower degree	endives, lettuce.

Fats — goose, dogs', eunuch's, goats', horses', stags', man's. Bones — human skull, asses' hoofs. Metals — white arsenic, copper-filings, calamine, iron, alum, tin, lead, sulphur. From the sea and the waters — petroleum, spermaceti, shell-fish. The following may serve as examples of the specifica, with their formulæ of preparation: "Specificum for epilepsy — vitriol, calcined until it becomes yellow, saturate with alcohol, add misletoe, hearts of peonies, elks' hoofs and the pulverized skull of an executed malefactor (!): distil all these dry, rectify the distillate over castoreum, species diamoschi dulcis, elephants' lice: then digest in a water-bath for a whole month, after mixing with salt of peony, alcohol, liquor salis perlarum et corallorum, ol. anisi et succini. Tincture of mummy — select the cadaver of a red, uninjured, fresh, unspotted, malefactor, 24 years old, and killed by hanging, broken on the wheel or impaled, upon which the moon and the sun have shone *once*: cut it in pieces, sprinkle with myrrh and aloes: then macerate for a few days, pour on spirits etc.

Examples of composita, with their names: pills — hiera picra Rhasis, pil. alephanginæ Mesuæ, pil. pestilentiales Ruffi. Species — diambar, diamargariton calidum. Narcotica—theriaca, aurea Alexandrina, Philonium, Mithridaticum, thryphera etc., etc.

A comparatively large number of popular "Kräuterbüchern" (Herbals),[1] which maintained their popularity long afterwards, made their appearance in this century: e. g. that of the far famed Meister Barthol. Vogter, an oculist of Dillingen; that of J. Schoener of Carlstadt (1528) etc. Numerous scientific pharmacopœias also appeared, among the forerunners of which we may mention the works of a certain Quiricus de Augustis,[2] a physician of Vercelli; of J. J. Manlius de Bosco (Luminare majus, medicis et aromatariis necessarium — Lumen apothecariorum — Thesaurus aromatariorum, 1528) and Paulus Suardus from the end of the 15th century. Among the pharmacopœias were the first German pharmacopœia of Nuremberg, published

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1. These "Herbals" at that time filled the place of "popular medical treatises" in general, and must have been very much sought after. Physicians also occupied themselves with the composition of "Guide-books" à la Baedecker, which contained some directions upon medical subjects for all sorts of accidents occurring upon the journey. Guilhelmo Grattaroli (Grattarolo, 1515-1568) of Bergamo, a professor in Marburg, published such a guide-book. ["A new herball" etc. by William Turner of Northumberland, England, first appeared at London in 1551. The second part was published in 1562, and the third in 1568. John Gerarde (1545-1607), head-gardener of Lord Burghley and a practitioner of surgery in London, also published a very quaint and curious "Herbal" in 1597. (H.)]
2. Phillippe calls him Quiricus de Augustis de Tortona of Milan. His work was entitled "Lumen apothecariorum", and was published at Venice in 1495. Paulus Suardus was an apothecary of Bergamo, who copied his "Thesaurus aromatariorum" almost entirely from the work of Quiricus. It appeared at Milan in 1512, and was often published with the "Luminare majus" of Manlius de Bosco. (H.)

by Valerius Cordus in 1535 (or 1546); the pharmacopœia of Cologne, 1565; that of Bonn, 1574; the pharmacopœia of Bergamo 1580, etc. The elements of military pharmacy also developed in this century of genuine progress, a title to which the 16th century, finally, may lay claim in that herbaria with plates made their way into Russia as early as 1534, and that in it the visiting[1] of bathing resorts, in accordance with the prescription of physicians (a proceeding customary as early as the 15th century)[2], began to become more and more frequent.

7. EPIDEMIC DISEASES.

In the department of epidemic diseases too the 16th century proved its reformative mission, if we may be allowed such an expression. On the one hand it witnessed the end of a few diseases of the Middle Ages, and, on the other, it introduced several new diseases into the life of the people.

Leaving out of consideration the epidemic forms of religious frenzy, which henceforth withdrew more and more from the public eye into the privacy of family life, the leprosy and the English sweating sickness belong especially in the class of diseases, which, from this time forward, faded gradually out of existence. On the other hand, the plague henceforth simply retreated further and further into the regions of the East.

Leprosy disappeared earliest from Italy, so that while at the beginning of the 16th century a few cases were still observed, at the close of this century it no longer appeared in this locality, save in a few places about Genoa and Ferrara, where it continues to prevail even to-day. In France likewise it lost its epidemic character, but did not entirely disappear until the following century. The same was true of

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[1] On these journeys to the bathing-resorts considerable luxury was often displayed. Thus the count-palatine Philip, prince and lord on the Rhine, travelled to Gastein in 1534 with 70 horses. The count-palatine Otto Heinrich, who built the famous "Otto-Heinrichs-Bau" of the castle of Heidelberg, travelled with 20 wagons, 50 horses and 18 mules. A servant of the poor carpenter's son Christ, however, surpassed both; for archbishop Wolf Dietrich, count of Raitman, took with him, in the year 1591, 139 horses and 240 persons, a goodly part of whom were females. The elector Augustus of Saxony in the year 1584, having sent forward scouts, travelled with 225 horses to Eltville, in order to enjoy the baths of Schwalbach. In these bathing-resorts everything was of the most primitive style. In the baths themselves — both sexes often mingled together — they had a right merry time. Before starting on the journey to the baths a venesection was performed and a purgative taken, according to the constitution and complexion. The same thing is done to-day among the people, only the bleeding etc. are practised at the bathing-resorts.

[2] "The polished Italian Poggio writes with great gusto from the Council of Constance, how at Baden in Aargau — the elegant and notorious bathing resort of the 15th century — he had seen the German men and women bathing without clothing in the same room, and how charming it was to see their innocent familiarities. (He called the German men coarsely enough "wine-skins", born to gormandize and guzzle.) A hundred years later Hutten praises the same German custom of bathing, and contrasts it with Italian manners, in which anything like the same freedom would be impossible without the grossest excesses." Freytag l. c. The term of residence at these bathing-resorts was ordinarily nine days, and the bathers remained many hours in the water, as at Leuk in the present day.

Switzerland and Spain. Denmark and England in the course of the 16th century rid themselves completely of the leprosy, while Scotland, the Netherlands and Germany were forced to suffer from its ravages in the seventeenth century, and in Sweden and Norway it still appeared epidemically even in the eighteenth. As leprosy disappeared the leper-houses also fell into disuse, so that Louis XIV. (1638–1715) was finally able to distribute their possessions among the poor. The greater cleanliness of this period, including the common use of shirts (which became customary during the 16th century), is regarded as the cause of the decline of this foul disease.

We have already stated that in the middle of the 16th century the English sweating sickness disappeared from the list of epidemic diseases.— On the other hand, the plague, during the whole 16th century, prevailed more generally, and in places more fatally, than ever before, as if desirous, before beginning in the succeeding century its return to the East, to make the West feel once more its reign of terror. This was true too in spite of a great number of "Plague-ordinances", issued in the form of books, reports and pamphlets by the authorities, as measures of public sanitation. Still the plague ravaged all places. Thus in 1500–1507 it raged in Germany, Italy and Holland, in 1528 in Upper Italy, 1534 in Southern France, 1562–1568 pretty generally throughout Europe. In 1564 it was particularly severe at Freiburg in the Breisgau, 1568 in Paris, 1574–1577 a general epidemic prevailed, during which in Louvain e. g. 500 persons perished in a single day, and in Vicenza, 340 in one month. The disease prevailed again in 1591.—It is characteristic of the improvement in the art of observation of this century that the plague was declared contagious and portable, and accordingly measures of isolation and disinfection were put in force against it, though without proving in any degree effectual. With a view to disinfection horn, gunpowder, arsenic with sulphur or straw moistened with wine etc. were burned in the streets, so that the statement "They are burning horn" signified at that time "The plague is there, and we can do nothing against it"— a condition which we now express euphemistically by the odor of carbolic acid! The administration of preventive doses of disinfectants was also customary at that period. The "Pestmedici" anointed the uncovered portions of their bodies with oil etc., or wore special "plague-dresses" and "plague-masks", "plague-gloves" etc. The plague-dresses were red or black; the masks were made of leather, had openings filled with glass for the eyes and a beak-like prolongation for the reception of disinfecting substances. Similar clothing was considered a means of protection down into even the present century.

Among those who wrote accounts of the plague, the following were the most prominent: Victor de Bonagentibus, Mercurialis, Salius Diversus (died 1591), Paré, Crato, Massa, Gesner etc.

With regard to the diseases which extended from mediæval into modern times, it should be remarked that syphilis, as our experience shows, laid aside its malignant epidemic character with the development of gonorrhœa in 1520, but only to extend more widely its milder sway; so that, in spite of the introduction in the 16th century of the external and internal employment of mercury and the administration of guaiac, sarsaparilla, sassafras and China smilax, it still exists to-day, equally among civilized and uncivilized people. A whole host of "Anti-mercurialists" existed even in that day, some of whom based their objections upon the doctrines of Galen. Among them we may mention: Leonicenus, Torella, Montagnana, Montesaurus, Monardus, Alex. Benedetti, Schellig, Raut, Vochs, Poll, Schmaus, Villalobos. Among the "Mercurialists" were: Sebastian Aquitanus, Brocardus, Ant. Benivieni, Peter Pinctor (Pinto, a Spaniard), Cataneus, Vella, Fracastoro, Widmann, Joh. Benedictus, Wendelin Hock (whom Procksch, the author of this catalogue, calls the most stupid of compilers), Joh. Almenar etc. Scurvy, in the course of this century, appeared epidemically at sea and often also on land, especially on the coasts of the North Sea

(Sweden, Norway, Finland, Denmark, Friesland, Prussia, the Netherlands, Lower Saxony), but also in the interior. It found its principal describers in Euricius Cordus, 1534; George Agricola (died at Ingolstadt in 1570) in 1539; Joh. Echth (1515–1544), a Dutchman, who died in Cologne; Olaus Magnus, in the year 1555; Ronss; Weyer; Dodoëns, who gives an account of two epidemics, in the years 1556 and 1562; Foreest; Eugalenus (1588); Heinrich Brucæus, professor at Rostock, in the year 1589; Alberti, in the year 1594; Balth. Brunner (ordinary physician of Anhalt, died 1604) etc. At this period, however, other diseases also were included in the term "Scorbutus", as e. g. a condition in which worms, accompanied with great pain, are said to have developed in ulcers. This disease, however, was described under the title "de lopende Varen" by Heinrich von Bra (died 1601), a physician of Dockum in West Friesland, who prescribed for it maybugs, while Petrаus recommended angleworms!

Ergotism also continued its epidemic visitations, though in much milder form, down into the Modern Era. Instead, however, of the gangrenous form of the Middle Ages (which yet appeared in Spain in 1565 and 1590), the nervous form of the disease, characterized by itching, formication, pains, rigidity, cramps, loss of consciousness etc. manifested itself, especially in Germany (1581, 1587, 1592, generally extended in 1595 and 1596, in Grünberg in upper Hesse in 1600) and in Holland.

Small-pox (first observed or described in Germany in 1493) and measles, whose specific nature was still unknown to the physicians of the West, likewise appeared in the 16th century (e. g. small-pox in Sweden in 1578).

The Grippe (influenza), for the first time recognizable with certainty as such, showed itself in the year 1510, and spread over all Europe. A second epidemic, beginning in 1557, was less widely extended. On the other hand, in 1580 and 1593 it became again pandemic, while in 1591 Germany alone was visited.

The following new epidemic diseases appeared in the 16th century: under the name "Garotillo", diphtheritic diseases appeared at six different times in Spain between the years 1583 and 1600, and were mentioned by Gutierrez as early as the 15th century. The chronicler Frank von Word also speaks of the disease in 1517 as an epidemic in which the fauces and tongue were covered with something like mould. Under the designation of "Colica Pictonum" an endemic lead-poisoning, resulting from bad management of cider or wine, broke out in the year 1572 in southern France. Under the title of "The Hungarian disease" appeared (1566) a form of disease intermediate between the plague and typhus fever. Whether this latter disease existed in earlier ages is not entirely free from doubt, but this much is certain, that in the beginning of the 16th century (1501) it ravaged almost all Europe, from Cyprus across Italy, in the form of an epidemic disease new to the physicians of that period. At this time, as was subsequently observed too in individual epidemics of the disease in England, young people of the higher classes were especially attacked. This peculiarity was manifested particularly by the epidemic of 1505 in upper Italy, a country which seemed to be a favorite home of the petechial fever, by which it was ravaged in 1527, 1528, 1535, 1537, and 1587. France, however, was severely visited by it in 1557. The wars of the 16th century contributed greatly to its origin and extension, so that the spotted typhus (called also at that period Hauptkrankheit, Faulfieber etc.), in the middle of this century, had already acquired in Europe, in place of the plague, the preëminence among pestilential diseases, a position which, as the prevailing form of typhus, it maintained up to the beginning of the present century. Typhoid pleuro-pneumonia, closely related to the foregoing disease, appeared epidemically in the 16th century, especially in Italy in 1521, 1535, 1537, 1557, 1568, 1586; in France 1571 and 1598; Switzerland 1550, 1564; the Netherlands 1557 and 1563, and finally in Germany 1564, 1567, 1583 and 1585. In the investigation of the diseases last mentioned the prominent epidemiologists of the 16th century rendered valuable service. These were Fracastori (a decided advocate of contagion), Victor de Bonagentibus, Massa, Dodoëns, Ballonius, Weyer, Codronchi, Dunus, Montanus, Mundella etc. The undoubted transmission of disease in many cases, and, indeed, in entire epidemics, by contagion — a method of conveyance, as Marx has shown, known even to the Ancients — was securely established, and its possibility by contact, by fomites and by the air was carefully examined. Finally the whooping-cough, now newly described, appeared in the 16th century in the list of epidemic diseases. Ballonius, who was the first (1578) to furnish us with a description of the disease, speaks of it, however, as of one already well known.

8. CONDITION OF THE MEDICAL PROFESSION.

If the foregoing observations have shown us how greatly medical science, its cultivation and nurture, were reformed and advanced in the 16th century, particularly by the knowledge of the Greek language and writers, as well as by anatomy and the revival of independent observation; on the other hand the condition of actual medical practice, in a peculiar and ever recurring way, depending upon the superstition and idleness of the masses and the timidity and indolence of the physicians, occupied a grade almost entirely mediæval. At that time ordinary practice was, in many respects, more than a century behind the age, a condition which we may likewise observe again to-day.

In the 16th century the higher physicians, the vast majority of whom belonged to the laity, generally received their education exclusively in the universities.

Among the latter the Italian (for reasons explicable from the history of the development of these institutions) enjoyed the greatest reputation as schools of medical education. Next in rank were the French, and last of all the German, though the latter too were well attended. The Italian universities were therefore naturally the aim of all those who desired a thorough education, especially as attendance upon these schools recommended the physicians of that day in the same way as did, until a short time ago, attendance at the university of Paris or Vienna the physicians of the present day, although in neither was anything new learned. Most famous of all (a condition at that time, as well as to-day, and even more than to-day, associated with the greatest concourse of students) were the medical faculties of Bologna, Pisa and Padua, next to which ranked Paris and Montpellier, then Basel.

The constitution of the universities of Upper Italy—and in this respect the other universities of Italy did not differ materially therefrom—was from the outset quite democratic, inasmuch as the students formed the controlling body of the community, and the professors were dependent upon them. This arrangement was in strong contrast with the institutions of to-day in our own and foreign lands, which are, as a rule, monarchical in their organization and dyed in nepotism.

The students chose the rector[1] and officers of the universities and even the teachers, and assisted in determining the curriculum of study— a plan which, in many cases at least, would be judicious to-day. They also watched over the execution of the curriculum. Besides this, divided in the different faculties, generally after their nationalities or so-called "Nations"[1] (the modern "Corps"), they had their "Rectors" and "Vice-rectors", chosen from each one of these nations. These officials, either singly, or in a body as a kind of "College of Rectors", negotiated with the officials of the state, a power which they did not lose until the close of the 16th century. The German nation e. g. was, during this century, especially influential at Padua, and therefore, as Fabricius ab Aquapendente once, while exhibiting and demonstrating the muscles of the tongue, indulged in some would-be witty remarks concerning the way in which Germans spoke Italian, they almost completely broke up his audience. (These "witty" remarks had a thoroughly "learned" basis; for they sprung from the fact that the professorial vanity of the teacher had been wounded by the Germans, who one year before had elected another person for their instructor instead of him.) Presidents or "Rectors" of any nation were originally required to be students, and were then frequently dukes or princes by birth. The nations possessed their own means and property.

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[1] In the Scotch universities the rector is chosen by the students at the present day. The university of St. Andrews was founded in 1411, Glasgow 1450, Aberdeen 1494 and Edinburgh 1582. No complete medical faculty, however, existed in the university of Edinburgh until 1685. (H.)

The students, at least those of the poorer class, often as "Travelling Scholars" acquired in Germany the preliminary knowledge necessary for attendance upon a university. As such they travelled from one of the Latin schools,[2] founded at that period in numerous places, especially through the activity and influence of Melanchthon, or, what amounts to the same thing, from one of the then famous teachers at one of those schools, to another still more famous. This was done by bands of students united together, and during their travels the worst barbarities were an every day occurrence. These travelling scholars supported life by singing before the doors, by begging or stealing, and for these objects the bands were formally organized.

The "travelling" began in early youth, and for many students never came to an end. "The younger scholars, called Schützen, like the apprentices of the artisans, were obliged to perform the most menial duties for their elder comrades, the Bacchanten. They were compelled to beg for their tyrants, often to steal, and they enjoyed in return such protection as the fists of their stronger comrades could afford. To have numerous Schützen was for the Bacchanten a matter of honor and of profit, for they brought to him the charitable contributions of the inhabitants. But when the rude Bacchant pushed on to the university or the high-school, he was paid off for all the injustice inflicted upon the younger scholars; for he was now compelled to promise under oath to lay aside his scholar's clothing and his rude manners, he was received with humiliating ceremonies into the noble fraternity of students, and was even obliged, like a slave, to endure wild jokes and insults". (Freitag l. c.) The "Pennal" (Anglice "Freshman") was forced to submit to the most horrible indignities. "Disgusting drinks, composed of phlegm, ink, vile, stinking butter and candle-snuffs, were given him to drink, and he was initiated by cuffs and kicks into the honorable position of an academic citizen" (A. Grün). Some grounds exist for referring this "travelling", and still more the begging, of the students, to an Oriental model. [The "fagging" of English public schools and the "hazing" or "training" of our American colleges are, of course, variations of this same system. Its antiquity, however, may be traced back even to the philosophical schools of Athens. (H.)]

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[1] Some of these "Nations" had special seals, and examples of these from the 16th century are still extant.

[2] While the Latin schools were founded by cities, after 1540 there arose, at the instance of princes or the state, "Gymnasia", which were under state supervision even in the matter of their curriculum. The learned professions were also limited to certain districts. (F. Paulsen, "Geschichte des gelehrten Unterrichts" etc., Veit & Co., Leipzig, 1885.)

On their marches the students stole money, geese, hens, goats, fruits, &c., whatever was not nailed fast, and they prepared their food in the nearest lodging or even in the open fields. Frequently the sky was their only covering by night. Yet many of these travelling scholars, after hard fortune, attained respectable positions, as e. g. Thomas Platter, father of Felix Platter. Many, however, indeed the most of them, fell into dissolute and vicious lives.

Again students who did not belong to the so-called travelling scholars, especially the poor, sang hymns before the doors and received food as pay, or alms in vessels which they carried with them, or they were invited into the house to eat, which was considered an honor.[1] Others boarded around, or earned money as choristers in the churches. The latter, however, was done, for the most part, by future divines alone.

The students of that time drank wine and beer still more than they do now, for, owing to the cheapness of liquors, bousing was the order of the day. A mug or litre of the famous Einbecker beer cost 4 pfennige (about one cent). Other famous beers were those of Torgau. Beer was also brewed in private houses, as it is in Bavaria to-day.

Those students who were better situated pecuniarily usually entered foreign, and most frequently Italian, universities.

In these universities the number of teachers was limited from the early part of this century. Thus in Bologna the number was fixed in 1579 at 166; in Rome from 1514 at 88, including 15 teachers of medicine. The regular duration of lectures at an early period was two hours; subsequently it was reduced to one hour and a half, and then to only three quarters of an hour, as at present. Excesses of various kinds were common in the Italian universities, especially during the Carnival, so that it was forbidden to attend lectures in masquerade attire. The Jews too were compelled to pay a certain sum of money into the students' carnival treasury, e. g. among the students of law in 1514, 104 lire; among the "Artists", 70 lire. The number of the students was in many of the universities quite considerable. Thus in the small university of Wittenberg it was in 1502, 208; in 1513, 151; in 1514, 213; in 1515, 218; in 1519, 458; in 1520, 578; while Vienna could count at the same period no less than 7,000. Still the attendance varied very greatly. Thus Erfurt had, in 1520, 310 students; in 1521, 120; and in 1522, only 15 students, while Leipzig, in the same years, had 417, 340, 285 and 126. Foundations and bequests in aid of poor students were frequent, and professors, particularly, distinguished themselves in this matter much more frequently than in the present day, when medical professors, especially, leave estates of millions without devoting one cent to science. In Bologna fourteen such foundations were established between 1257 and 1650, and in Padua no less than 27.

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[1] Luther was the recipient of such an honor. The reformer too, like all students of that day, wore a sword, and on one occasion, when he suffered a bad fall, wounded himself severely with it in the thigh.

The students often wandered from one university to another, just as they do to-day, only they travelled either on foot or horseback. Even the professors in the 16th century (an age characterized generally by its migratory disposition) were very mercurial people,[1] and, in spite of their want of any other means of locomotion than were afforded by their own feet, a horse or a purgatorial cart,[2] they were sometimes here, sometimes yonder, and in one year frequently occupied a residence widely removed from that of the preceding year. Thus e. g. Vesalius taught now in Padua, now in Pisa, now in Louvain, again in Basel, sometimes in Augsburg, again in Spain. So Winther von Andernach taught in Louvain and again in Paris, and the Italian Franc. Antonio Pigavetta, in Heidelberg. "As regards medicine, many physicians were eminent cultivators of classical or medico-philological studies, for the sciences were not yet elaborated so much in detail and in so exclusive a method that this course was impracticable. They could still support a universal and liberal desire for knowledge." (Ranke.) Everywhere free emigration[3] was the rule for both students and teachers. The universities, consequently, frequently changed their corps of

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1. Among the savants this depended upon their desire for learning and passion for science; for there was no periodical press by the aid of which they could quickly obtain information of the acquisitions and discoveries of remote countries, and letters circulated only slowly.
2. The use of wagons was looked upon as effeminate from the time of the Middle Ages. A public post has, indeed, existed in Germany since 1517, but at the period to which we now refer it was very imperfect. Letters were taken charge of by private or public messengers ("geschworne Boten"). The public post was an imitation of the cursus publici which existed among the Romans from the days of Augustus, who was the first to employ wagons in its service. Postage by messenger was relatively high. Thus between Frankfort-on-the-Main and Mayence in 1487 it was four heller, or one twenty-fifth the value of a wether, and four-sevenths that of a hen. A quire of paper cost 9 heller. The hire of the wagon with three horses for 42 days with which Luther travelled to Worms, was at the rate of 4,30 marks per diem (about $1,07), a sum to be estimated at about five or six times that amount in our money of the present day.

   [A system of postal communication was begun in England in the reign of Edward IV., 1481, when riders on post-horses went stages of twenty miles each in order to procure for the king the earliest information relative to the war with Scotland. The system was improved and extended in 1543, and in 1643 the post-office yielded an annual income of £5,000. Louis XI. established posts in France as early as 1470. (H.)]
3. Freizügigkeit, i. e. liberty to come and go whenever or wherever they pleased, without requiring any special permission from the authorities. In the total absence of any restrictions upon voluntary migration in this country we have no word which precisely translates the German term. (H.)

professors. This, however, accorded with the fact that the members of the Faculty were in part chosen by the students (especially in Italy) for only one year, or at least after the lapse of such a period they must be again confirmed, an arrangement to which an exception was made in the case of greatly respected and beloved teachers only. If a teacher was defeated in such an election at one university, he went to another. The professors gave also so-called "Gastrollen",[1] without any view to obtaining positions, a custom also common at an earlier period. Thus e. g. Peuerbach and Regiomontanus delivered lectures by invitation at Padua. Famous teachers were received with great ceremony. Professors and students too stood in more friendly relations than at the present day (when the former keep themselves aloof from the latter), and thus the attachment of the students was secured throughout their life. The rates of salary of teachers in the universities naturally varied very much.[2] Still those of the German schools were the poorest. Melanchthon e. g., one of the most important and famous, received during his first eight years a salary of 171 marks ($43), so that, during this period, he was unable to buy his wife a new dress; after 1526 he received 242 marks ($60); ten years later, 520 marks ($130), and from 1541, 680 marks ($170), a sum at the present day equivalent to about $750. The professors at Heidelberg received an annual salary of only 85–105 florins; those at Würtzburg, 210 marks with free board in the Julius Hospital and a female assistant (!) in distilling, while Vesalius at Pisa received 4000 marks ($1000). To this salary are, of course, to be added the fees for lectures and examinations. But with German, and especially with teachers of little celebrity, the amount of the latter also was quite insignificant, so that they were compelled to make up the deficiency by literary work (especially translations), although this business was then still worse paid than now. Besides this they were forced to resort to private practice, through which they, from necessity (as many do to-day without similar need), withdrew their best energy from their professorial office and calling in order to make a bare living. Many professors, therefore, pursued other reputable occupations, e. g. printing, or they took — frequently — students to board etc. A few also were ordinary physicians of the various princes. Many of these men too fairly challenge our admiration by their heroic struggle with the most adverse fortune, in which only the love of science strengthened and sustained them. They satisfied their thirst for science and their efforts after truth and knowledge, while not infrequently hunger and its results preyed upon their bodies. Still it is

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1. These were extraordinary lectures, given upon invitation, by certain eminent professors of other universities. In theatrical parlance these eminent professors occasionally "starred it". (H.)

2. The income of two of the professorships founded at Oxford and Cambridge by Linacre in 1524 was £12 each. The income of the third professorship was only £6. I presume this gives a fair idea of the salary of English professors in the 16th century. (H.)

not in the 16th century alone that the vast majority of those who have promoted the sciences and arts have sprung from the so-called lower class, and often enough from actual proverty. The history of civilization teaches that the advances of science, knowledge and ability have proceeded not from the rich, but from the poor, rich, however, in spirit and energy.

That bitter literary struggles and disputes between the professors took place also in the 16th century needs no special mention, for this has been the case in all ages, frequently with a total disregard of personal reputation, always in disregard of the honor of science, and not always from the purest of motives. But it should, however, be noticed that such disputes and quarrels in the 16th century were the occasion of the founding of several universities. "The physicians Simon Pistorius (died 1523) and Martin Pollich (surnamed lux mundi, died 1513), who lived in Leipzig, had become so embittered against each other from their antagonistic views relative to syphilis, whether it was epidemic, endemic or contagious, that they could not bear the sight of each other and resolved to seek another home. In order to obtain in another place a suitable position as professor, Pistorius influenced the elector Johann to select Frankfort-on-the-Oder as the site of a new university. Pollich was equally fortunate with the elector Friedrich, who selected Wittenberg for his university" (Marx, "Caspar Hofmann," 1873).

The curriculum of instruction, even in the 16th century, in the main embraced only discussion and explanation of certain works of the Greeks and Arabians. Even anatomy at the beginning of the century was studied almost exclusively in Galen, more rarely in Mondini, and not at all in the works of the recent investigators. Many of the professors were originally "Humanists", i. e. classical philologists, and then turned their attention to medicine. Such was e. g the "schoolmaster" Fuchs. Others of them had been mathematicians etc. Yet in the course of the century instruction won a better, or if you will, a "modern", form. "Botanical gardens" e. g. were now established at different universities.

In anatomy dissections at least were made frequently, though for the most part these were confined to animals, as e. g. even in Paris.

In the department of anatomy, however, there were great theoretical disputes also between the doctors. Naturally! for the actual section of human bodies (in which the thoracic and abdominal cavities alone were opened, while the cranial cavity was left untouched in obedience to popular prejudice) was performed, as a rule, by the barbers, while the learned professor of anatomy merely explained the exposed, but not dissected parts. The first operation was considered unworthy of an educated physician, ungentlemanly, and even disreputable, and was accordingly abandoned to the barbers. For the performance of such dissections in the universities (they were still prohibited by the Church) papal indulgences were necessary, and these, of course, cost money, for the acquisition of this was the chief study of the pope. Tübingen received such an indulgence as early as 1482, while in Strassburg, in spite of papal prohibition, permission to dissect an executed criminal was granted by the magistrates in 1517. Before and after each special dissection (which was, however, a relatively infrequent occurrence) religious ceremonies in many places were considered necessary. In order that those who came into contact with it might not become "disreputable", the corpse was first made "reputable", the professor beginning the proceedings by reading a decree to that effect from the lord of the land or the magistracy and then, by order of the Senate or the medical faculty, stamping upon its breast the seal of the university. The body was then carried (upon the cover of the box in which it had been brought in) by volunteers for this service into the anatomical hall, and the cover, upon which it rested during these ceremonies, was then taken back to the executioner, who had meanwhile remained at some distance with his vehicle. Where the corpse had been beheaded, the head, during the performance of the necessary ceremonies, lay between its legs. Afterwards entertainments, graced with music by the guilds of city fifers, trumpeters, trombone players etc., or by "itinerant actors", were given. Gradually, however, this folly waned, and in the second half of the century public anatomical theaters were established. This occurred at Paris and Montpellier in 1551.[1] Such a theater was built by Fabricius ab Aquapendente in Padua (the most popular and famous medical institution of the 16th century) at his own expense in 1549. This, however, in consequence of the excessive height of the tiers of seats, was so dark that the dissections, even by day, could be made only by torch-light. Basel had an anatomical theater in 1588. In Bologna the professor of anatomy only was permitted to give lectures on practical anatomy whenever he wished, while to the other professors it was allowed only at stated times. Until the 16th century all the professors had the same authority as the professor of anatomy. In spite of the improvement in the conditions of anatomical instruction, it was still considered a special attraction for a university, and still more for a professor or a physician, to possess an entire skeleton. The price of a skeleton in that day was very high. Thus Heidelberg in 1569 paid $72.00 for a single skeleton.

Clinical instruction, which, as we have already seen, had existed among the Arabians long before, was imparted nowhere in the Christian West (with the exception probably of Salerno) before the sixteenth century. Montanus was the first person to hold clinical lectures for a short time. He died in 1552, and it was not until the year 1578 that, at the instance of the German students — the students, as we learn above, took the initiative

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[1] The first law relative to the study of practical anatomy in England was passed under Henry VIII. in 1540, and authorized the "Masters of the Mystery of Barbers and Surgeons" to take each year four bodies of executed felons "for anatomies". This number was increased to 6 under Charles II., "provided they be afterwards buried". Under queen Elizabeth in 1565 a similar privilege was granted to the College of Physicians. (H.)

— the experiment was continued at Padua, where "Albertino Bottoni (died 1596 or 1598) visited the sick men and Marco degli Oddi, the sick women, and discussed their diseases. (At a later period this example was followed at Pavia and Geneva.) As towards the end of October of that year the weather became colder, female bodies were also opened, and the professors pointed out the diseased parts." This confirmation of diagnosis by the sectio cadaveris or pathological anatomy was at once stopped, however, by an official prohibition, "since the rival of the above mentioned physicians" — at that period too the envious rivalry of the professors (often of late years so disgustingly renewed) was a positive injury to science — "Emilio Campolongo had carried away to his house upon the same day the uteri of these women, over which action the surviving old wives raised a great clamor". Indeed they finally succeeded in effecting the prohibition of such examinations, because, in accordance with the superstition of that time, they dreaded lest, after the resurrection, the absence of the uterus, not safe against theft even after death, might deprive them of fecundity in the world of eternity. The influence of the Church too was so great that in Bavaria the professors of medicine were compelled to take an oath to obey, and to teach in accordance with, the decrees of the Council of Trent, and the same was the case in other countries. Pathologico-anatomical dissections, however, together with clinical instruction, speedily came to an end.

The scientific and other demands made upon the future German physicians may be most clearly and best shown from the statements which follow. These may serve also for a model of the arrangements existing in the Middle Ages, from which they do not differ materially.

STATUTES OF THE MEDICAL FACULTY AT FRANKFORT-ON-THE-ODER FROM THE YEAR 1588.

The Faculty at the close of the 16th century showed the following 7 professors, viz: Jacob Bergmann (received 1559, died 1595), Johann Cnobloch (1562, d. 1599), Sebast. Moller (1588, d. 1609), Matthäus Zeisius (1591 to 1607), George Seiler (1591, d. 1606), Christ. Stimmelius (1595, d. 1615), Laurent. Heilandus (died 1621). The first-named was dean 4 times, the third 11 times, the second 4 times, the fourth once, the fifth 8 times, Stimmelius 8 times, Heilandus 8 times.

1. "It is ordered that no one exercise the authority or office of a physician unless he has at least first received the degree of "Baccalaureus" in this academy". (The Baccalaureate, from the very beginning of the universities, was the first preparatory grade for the dignity of the doctor. Originally too evidence of the ordinary knowledge required for this first grade was sufficient for reception into a faculty, even if this knowledge had not been acquired strictly in the institution concerned. At a later period this knowledge was required to be obtained in the university itself). "If, however, he has received such a degree from another university, he shall not be admitted to the course on practice until he has paid the fees. These fees for the reception of a Baccalaureus are established at 8 goldpieces (ducats), to go to the treasury and to the doctors."

"2. The candidate for the Baccalaureate in medicine must be a Magister artium liberalium, or bring evidence of having been well instructed in philosophy (The examination for the degree of Magister artium corresponded to our Maturitätsexamen, and the candidate after passing was also called "Baccal. Philosoph." The philosophical faculty claimed the right to confer *this* degree upon the students of all faculties.), "and he must have heard carefully the following lectures: one fen (section) of the first Canon of Avicenna, the Aphorisms of Hippocrates, and Galen's Tegni[1]. Besides, he must have followed the practice of a doctor for six months or more" (this corresponded to our clinical instruction). — "If, however, the Baccalaureus in his lessons" (which the Baccalaureus, as an assistant to the professors, was compelled to give to the "Scholars") "lays himself open to the charge of carelessness, he shall pay 6 gulden in gold for the Baccalaureate in medicine, as an indemnity for the trouble occasioned (by his carelessness) to the doctors" (the Baccalaureus was in fact a preparatory assistant) "and shall preserve his grade as Baccalaüreandus for 9 gulden in gold, of which one half goes to the treasury."

STATUTES FOR THOSE WHO HAVE GRADUATED AS BACCALAUREI.

3. "For the attainment of the Doctorate in medicine, he who has attained the degree of Baccalaureus must for at least one year deliver lectures upon the following subjects: one book of the treatises of the first Canon of Avicenna, or the Aphorisms of Hippocrates, or the books — De locis affectis — of Galen. Besides this he must attend the lectures of the doctors, delivered for the attainment of the Doctorate, on the subject of Galen's first book De accidenti, De morbo, or the Tegni and the 9th book of Almansor." (The student was not only a learner but a teacher likewise).

4. "The Baccalaureus in medicine, during his vacation and upon the requisition of the Dean of the Medical Faculty, shall discuss once in public some subject taken from his lessons. This disputation must be attended by the Dean on penalty of a fine of 3 gulden in gold."

5. "No Baccalaureus, Licentiate or Doctor in medicine shall enter into a disputation, unless the question to be defended is laid before the Dean and receives his approval."

6. "The Dean of the Medical Faculty, after having made a requisition upon the doctors specially and individually, shall twice each year summon the graduates and scholars together, in spring to visit the meadows, mountains and valleys, in order to acquire information of herbs and their properties. To these gatherings the apothecary or apothecaries shall be invited. In the autumn the object of these excursions shall be to gain a knowledge of the roots of importance in medicine. The scholars shall provide the usual banquet." These botanical excursions, which existed also among the Arabians and were, indeed, adopted from them, terminated with substantial enjoyments.

7. "After a disputation has been held" (with other students etc.) "for the Baccalaureate or the Licentiate of the Medical Faculty, the candidate may demand the opening of his examination whenever he wishes to do so, and the Dean shall be bound then to summon the Doctors of Medicine, in order that his petition may be answered."

STATUTES FOR THE CANDIDATE FOR THE LICENTIATE.

8. "If the candidate for the licentiate of medicine aspires to a higher degree, but has been careless in the delivery of his appointed lectures or in attendance upon his own instruction, he shall pay 18 gold gulden for distribution among the Doctors, that they may be correspondingly compensated for their trouble thus occasioned. He shall, however, finally receive his degree for 14 ducats, of which one-half belongs to the treasury."

9. "In the Doktoratsaula he shall again give 15 gold gulden (120 marks or $30), of which one-half shall go to the treasury, the remainder shall be divided among the Doctors, as compensation for trouble had in the aula and for the disputations etc."

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[1] Tegni = *τέχνη ἰατρική* — the "Ars parva". (H.)

STATUTES FOR THE RECEPTION OF THE DOCTORS INTO THE FACULTY.

10. "The newly graduated Doctor shall pay 6 ducats for his reception into the Faculty. If, however, one has graduated from another university, but desires to be received into practice here" (at that time the universities alone granted permission to practice) "and to be taken into the Faculty, he shall pay as much as the Doctor of Medicine, who graduated here, has paid for his Licentiate and Doctorate, that is 38 golden gulden." (The "Licentiate" authorized the exercise of practice under certain conditions, while the Doctorate permitted an unconditional practice.) Luther paid for his degree of Doctor of Theology 50 Rhenish gulden, about 85 marks ($21). In Bologna graduation cost 160 marks ($40), and this was considered very dear.

OATH OF THE MEDICAL FACULTY.

11. "I N. . . . swear to you, the Dean of the Medical Faculty, and to both Professors, as well as to the other Doctors of the Faculty, obedience and reverence in everything honorable and allowable; that I will keep all the present and future statutes of this alma, and wherever I go I will keep in view her best interests. So may God and his Evangels be gracious to me."

The conditions and the closing ceremonial of graduation we have already given in speaking of Salerno. The first dissection at Frankfort-on-the-Oder is noticed in 1600. The subject was a criminal executed by hanging. The total cost of the Doctorate amounted to 52 ducats — at that time a considerable sum of money. To this must be added the expense of presentation-gloves, of a special mass and banquets, besides presents to the professors. The ceremonial of graduation took place generally in church. As early as 1590 the privilege of practising was granted to the students by resolution of the Faculty. The degrees of all universities, even those of foreign lands, were considered equivalent everywhere.

The number of graduated physicians (who enjoyed as yet absolute freedom of travel through all lands, while the professors enjoyed similar liberty as to teaching) was in general inconsiderable. Thus in Bremen the first regularly graduated physician settled in 1510. On the other hand, the number of persons who practised medicine was tolerably large. Thus in Basel in 1557 there were not less than 17 empirics and regular physicians. How practice was obtained there may be judged from the following passages in the autobiography of Felix Platter:

"Before the New Year, and even later in the Spring, I did not have much to do. Still I did the best I could whenever an opportunity offered, at meal times or on other occasions, to talk about diseases and how to treat them, so that often when at home conversing with my father-in-law, who sometimes took a meal with us, and was a good and very experienced surgeon — he was a butcher — I was picked up and taken in hand by him. I needed still more experience: "practice is different with us"—Platter had studied in France. As a young man I listened unwillingly to such comments and often disputed them, yet I could do nothing but submit, as I had still no practice. However practice began to come to me and gradually to increase. As there were 17 doctors in the place, I was forced to use artifice if I wished to support myself by my practice, and God also imparted to me his rich blessings. . . . .
I began to receive the patronage first of citizens, then of the nobles, who tested me specially by sending me urine, from which I was expected to make a prognosis. In this business I so managed that several were filled with astonishment and began to employ me regularly. From day to day I gained more and more practice, both among residents in the city and also among strangers, some of whom came to me and

remained for a long time in order to use my remedies, while others again departed carrying with them my medicines and my counsels. Foreigners also summoned me to their houses and castles, to which I hastened and remained but a few moments, hurrying away at once again to my house, so as to be able to attend to many at home as well as abroad."

As regards the competition which the regular physicians had to overcome he remarks as follows: "The Ammann, called the Bauer von Utzendorf, was also very famous at this time, and many people patronized him. He could prognosticate from the water, and made use of many curious arts, by which he had acquired great wealth. After him the Jew of Alsweiler was for a long time very popular. There was also an old woman in Gerbergässlein, who had a throng of patients, as did the two executioners, the brothers Käse, Wolf and George, of whom the elder was famous in medicine at Schaffhausen, as was his father Wolf also, executioner at Tübingen."

Felix Platter began his housekeeping very modestly as a city physician. The dowry of his wife consisted of 71 marks ($18) cash, and in the line of household furniture — an old pan and a wooden bowl in which food was carried to her mother when in childbed, together with a few other poor articles. Their residence for three years consisted of a single room, their table had belonged to his father, and Platter's consulting office was a room without fire. (Vid. Freytag l. c.) All this, of course, was very plain, but we must not measure it by the rule of the present day. At a time when people took off their shirts at night in order to save them, and in citizen circles went to bed stark naked, simplicity was as natural, as in our age of external show are silken furniture and oil-paintings in the consultation rooms of dentists.

At Frankfort-on-the-Main there was only *one* Christian physician; all the others were Jews. Giessen had no physicians of the higher class at all, and in case of need was compelled to summon them from Frankfort.

The physicians of the 16th century were often quite as roving as the students and professors. As ordinary physicians of the then numerous temporal and spiritual potentates, or as city-physicians, they were frequently bound to a fixed residence by a contract for a shorter or longer period, at the expiration of which they exchanged for another residence, when they made a new contract. In 1519 the city physician of Heilbronn received a salary of 85 marks ($21) and his wood — the same as a councilman. He was required to practise in accordance with the regular tariff, could not leave the city over night without the permission of the burgomaster, and twice a year, after the Frankfort fair, he was expected to inspect the apothecary's shop. He was forbidden to dispense drugs, but, on the other hand, was protected from competition for ten years, since no other physician could settle in the city as long as his contract lasted (Betz). As a kind of itinerant physicians too, like Paracelsus e. g. and others, they practised and held consultations in writing at a distance in cases of disease which were described to them. This was done by Vesalius e. g. as well as Paracelsus. But the former went to work very cautiously in a certain case and was very reserved, because he had not seen the patient — a cripple in one foot — while Paracelsus ridiculed with the utmost boldness the former physicians of his patients. The physicians in-ordinary (in Spain they were required to kneel down when they felt the king's pulse) were not infrequently also alchemists and astrologers to their lords — e. g. the great astronomer and physician Johann Kepler — and most of them occupied a miserable position. In this double office they frequently received considerable salaries, as e. g. Thurneysser, who enjoyed an annual salary of 3756 marks ($939) from the margrave of Brandenburg. Others, like Dr. Stolle, physician of the bishop of Würzburg, were compelled to be satisfied with a salary of 140 marks ($35), a court dress (uniform), and a few other perquisites. A Brandenburg court-physician received annually 171–220 marks ($43–55), and had his office, servants and use of horses free.— City physicians of Frankfort-on-the-Main — there were three of them — received a salary of[1] 17–171 marks ($4.25–$43). Complete medical ordinances now existed in many places in Germany, e. g. in Würzburg, Frankfort-on the-Main Nuremberg etc. The Nuremberg ordinance permitted sworn physicians only to practise. "Empirics, like peddlers of theriaca, tooth-drawers, alchemists, distillers, ruined tradesmen, Jews, dealers in the black art, as well as old women who are accustomed to attend the sick and to boast that they possess the art of the doctors, and all such persons, are forbidden to treat the sick or to administer drugs to them, either publickly or secretly, without the permission of the council, under penalty of banishment if foreigners, or of a fine of 20 marks ($5), if residents of the city. Those who conceal or patronize them shall suffer an equal punishment." The ordinance was likewise directed against the practice of uroscopy, because nothing certain could be concluded therefrom — an example of insight quite exceptional in those days (E. Solger).

The usual pay of physicians was not generally so small in reality as it appears when we take the present value of money as the basis for comparison. Such a basis would be entirely false, for an equal sum at that period had at least a fivefold, and often a tenfold, value. In fact we may call the remuneration very good in comparison with the fees of the present day. The Germans in the 16th century were still counted among the most well-to-do nations. According to the Würzburg medical tariff, the physician in chronic cases, when he visited the patient once a day, received two gulden per week. The system of visiting and payment was, however, different in severe cases and in acute diseases. When the physician was compelled "to see the patients almost every hour" he might demand 1,71 marks (41 cents) every second day, but he might also accept higher pay if offered to him voluntarliy. The treatment of the poor was gratis *by law*, a regulation which until a short time ago still prevailed everywhere among us. Similar regulations existed at Frankfort-on-the-Main. According to the medical ordinance of 1577, uroscopy cost in this city 1 Batzen,

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1. The salary of Benedict Frutze, ordinary physician of Henry VII. of England in 1485, was £40. John Veyrery, chief surgeon of Henry VIII. in 1510, received the same sum, as did William Goodouns, Serjeant Surgeon of queen Elizabeth in 1581. Dr. Venando probably a Spaniard), physician to Catharine of Aragon, wife of Henry VIII., in 1519 received, however, semiannually a salary of £33 6s 8d. The usual salary of the English physician-in-ordinary during the 16th century would seem, however, to have been £40.

about 12 pfennige (3 cents). A single visit to a laborer was 1.65 marks (40 cents); a night visit to a well-to-do patient, 1.71 marks (41 cents); to one of very moderate means, half this sum. In chronic diseases the fee per week was 1.71 marks (41 cents); a consultation by letter cost 5 marks ($1.20); simple advice by letter, 75 pfennige, to 1.50 marks (18 cents to 36 cents); consultations, for each physician 10 marks ($2.40); among foreigners, a single visit 1.50 marks (36 cents); the second visit 58 pfennige (15 cents); the oversight of quacks was very severe. (Stricker) In Heilbronn uroscopy cost about 10 pfennige (2.5 cents); a single visit to persons worth 1700 marks was 30 pfennige (8 cents); per week 1.40 marks (34 cents); the single prescription, 20 pfennige (5 cents). (Betz.) On the other hand, in Nuremberg the first visit cost 2.15 marks (52 cents); in plague cases, 2.85 marks. At Wimpfen, even prior to 1404, the council, in cases of dispute, determined the amount of the honorarium to be paid to the physicians.

A few physicians, particularly "Specialists" in syphilis — at that period as fruitful a field as the "secret" diseases are to-day — acquired considerable wealth. Thus Fabricius ab Aquapendente — the professors even at that time skimmed off the cream of practice — in spite of considerable expense in building as we have seen, left 200,000 ducats. Berengarius of Carpi, besides valuable furniture, had 5000 ducats, which he, like Thierry de Héry, whose possessions were quoted at 150,000 livres, had acquired chiefly from this then quite new specialty. With most physicians — most German physicians at least — the results of practice were like those of Theophrastus, who left nothing. In our father-land, ever distinguished for its poverty and its — faith,[1] science and practice at that time too were in a very bad condition. This will explain e. g. the fact that, after several persons had died suddenly, one after another, with similar symptoms, while two post mortems had been made and two months had flown in consideration of the cases by several physicians, three doctors finally found that the drugs of an itinerant Jewish physician had killed the patients.[2]

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1. How far this faith went may be judged from the story related by Thomas Platter that Dr. Epiphanius, a physician of the duke of Bavaria, was compelled to fly from Munich because he had eaten meat upon a fast-day; otherwise he would have been beheaded, as were his companions who did not fly.

2. The following account also gives us a pretty picture of the condition of medical matters at that time. Besides all sorts of so-called physicians, many itinerant Jews carried on business: "The shameless, idiotic Jews also, though banished from the land, had nevertheless no hesitation in travelling and riding about in Würzburg and the adjacent places, their urinalia in hand or carried upon the pommel of the saddle, professing and boasting, whenever anyone was sick they would from a simple examination of the water diagnosticate and make known the disease and its causes, whatever length of time it might have existed. Thus they cheated the poor people, and, indeed, sometimes the nobles and great lords, out of large sums of money . . . which is pitiable and disgraceful, to be overrun and mocked at by such heathens, who would more properly be persecuted by the Christians. After such management, and after, if possible, invoking the

The penalty for these murders consisted in subjecting the Jew to a new examination, and then, when he had passed this — to let him go on quietly again with his murdering! Superstition, astrology, the making of horoscopes, miraculous cures and quackery never bloomed more freely than among the people, and in the century, of the Reformation. Uroscopy particularly — "Brunnenschau" as it was then called (Luther had translated the Hebrew term for the meatus urinarius in women by "Brunnen") — and urinary prognostics were an every day business, so that in pictures the doctor and the urinal always stood beside each other. These uroscopists found their doggerel immortality in the right royally pitiful rhyme of the "Theuerdank",[1] though these same things are done frequently enough also to-day in both open and secret practice.

> "Doktor! Ihr habt nun seinen Brunnen geschaut:
> Sagt mir ob ihr euch getraut
> Ihm zu helfen von der Krankheit?"

The doctor said that, according to the indications of uroscopy, the disease might be a fever, and that, with God's help, he would cure the patient. But

> "Nach Inhalt Avicenna lehr,
> So muss man ihm schwach Arznei sehr
> Eingeben, denn die starke soll nit:
> Ein simpel Complexion[2] wohnt ihm mit!"

Physicians-in-ordinary were appointed especially to inspect every morning the "water" of their gracious lord, so as to anticipate with medicine, while there was yet time, any danger which threatened their most gracious master and might be discerned in the urine. From this exquisite humor and salty fluid were made not only the diagnosis of the disease, but also of its procatarctic[3] causes — something in the style of that doctor of the present day who, by holding up before his eye the urine glass,

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aid of the magic spells of both males and females, then for the first time recourse was had to the doctor, in order to have him examine the water" — a system, which, with some variations depending upon the times, is frequently followed to-day!

[1] The "Theuerdank" is an allegorical epic poem by Melchior Pfinzing, provost of the Sebalduskirche in Nuremberg and private secretary of the emperor Maximilian I. It was published in 1517. (H.)

[2] A simple temperament or natural constitution. There were four complexions with their combinations. (Baas.)

Perhaps we may venture to translate these verses into right royal and pitiful English doggerel as follows:

> "Doctor! His water you now have surveyed:
> Dare you promise me truly that he shall be made
> Well, sound and free from his present disease?"

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> "After the teachings of old Avycen,
> Weak drugs alone must be given to him.
> Strong drugs, I ween, will not answer so well,
> For a simple complexion within him doth dwell!" (H.)

[3] That is exciting causes. (H.)

diagnosticated a fall down a flight of twelve steps. Moreover in this way was determined the existence or non-existence of pregnancy — "a deceit of which the physicians themselves were conscious", which fact renders the disgrace only the more indelible. Such an examination of the urine cost about 12 pfennige (3 cents), in Würzburg in 1502, 10 pfennige. Here and there a urinary glass was—the sign of a physician.

Many a one may have thus earned for himself a fur-trimmed robe, though he understood nothing of special chemical investigation, upon which Paracelsus laid such stress. On this point says Basil Valentine, "Hereon now the doctor in the long fur knows little to say. . . . O ye poor, miserable people, ye inexperienced physicians and pretended doctors, who write great long prescriptions on a long paper and large scraps!", and, as he warms up still more, he cries in the pithy parlance of the times, "Ah thou poor, pitiable, stinking bag of worms, thou miserable earth-worm, and wretched creature, why dost thou fumble after the husk and neglect the kernel?"

It was also still an important part of the business of the physician to determine from the stars the proper time for bleeding and purgation. If somewhat qualified in literary matters, he prepared the "Aderlasszettel", that is the "Aderlass- or Lassman"—a human figure having the points suitable for bleeding marked thereon, with information when, and under what constellation, each should be chosen—for the almanac. In accordance with this chart barbers proceeded to bleed without the advice of a physician, and the sick assumed their own guidance. It was towards the close of the 16th century that physicians first found this humbug unworthy of their profession, but the figure and the business of the barber connected therewith may yet be seen in the almanacs of the beginning of our own century. The physicians were also famous experts in astrology, and therefore in predicting the weather, fortune and misfortune etc., and as the almanacs were filled with such things (as they are even at the present day), they formed the most acceptable calendar-makers.[1] (In China physicians are still the court astrologers.)

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1. According to Briggs, similar almanacs appeared in England at a very early date. The Savilian Library at Oxford contains a MS. calendar compiled by Petrus de Dacia about the year 1300. This Petrus is credited with the invention of the "Homo signorum" or "Anatomy", a figure analogous, I presume, to the German "Aderlassman". Roger Bacon (1292), Walter de Elvendene (1327), John Somers (1380), Nicolas de Lynne (1386) and numerous others, are also said to have issued almanacs at a very early date. The earliest almanac known to have been printed in England was the "Sheapherd's Kalendar", translated from the French and printed by Richard Pynson in 1497. About the same time appeared an almanac in black letter from the press of Wynkyn de Worde. Other almanacs by Anthony Askham (1550), Simon Henringius and Lodowyke Boyard, "Doctors in Physike" (1551), William Kenningham, "Physician" (1558) etc. are mentioned by the antiquarians. Dr. Thomas Twyne of Canterbury is also mentioned as a famous editor of almanacs in the 16th century. A more notorious astrologist and almanac-maker, however, was William Lilly, whose "Merlinus Anglicus Junior" appeared in 1644 and was continued after his death in 1681 by his pupil Henry Coley. In the United States almanac literature developed early and with astonishing rapidity. The first book issued from the Harvard printing press was "An

Such almanacs of that period and still later, taught, among other valuable information: "When Phlegmatici, mucous and snotty people, Melancholici, low-spirited and melancholic people, and Colerici, passionate, lean people," should be bled.

In general, however, the physicians in the long velvet-trimmed, official doctors'-robe, or in their fur pelisses, enjoyed great respect, although at that time, as at all times, they incurred the satire that they professed to be able to cure diseases, but in fact could not cure them; that they were ready to employ at once the newest therapeutic fashions, and that they thus filled the churchyards.[1] Regularly educated physicians (called at an early period "Puchaerzte") were for gentlemen and rich merchants, counsellors, burgesses and citizens, rather than for the masses. The latter still lived in oppression and want, and were not situated much higher or better than bondmen, of whom there was still a large number. The common people, indeed, even in the 16th century, were not quite advanced enough to go to a physician, like the mediæval Arabians — in fact they are not equal to this everywhere to-day! — but they still stuck to God and the saints in their diseases, or resorted to vagabond charlatans and quacks, Jews, old women, hangmen, etc., or to clergymen, nurses, barbers, itinerant drug-peddlers and similar pseudo-physicians. They were still far too poor to pay the expensive physicians, a fact which may be inferred from the existence of books such as "An apothecary for the common man, who cannot call the physicians" (1564). So dry had they been sucked, and into such slothfulness had they been precipitated, by the church and the feudal lords! — although, even in accordance with special medical ordinances, the physicians were required, e. g. at Würzburg, to grant credit until after the next harvest to those of very moderate means. Besides, the common people recoiled from the gentlemanly and grave manners of the doctors, as they do in some cases to-day.

[The famous Dr. John Kaye (1550) discourses of the quacks of his day, and reproves the fondness of his countrymen for foreign novelties, in the following sesquipedalian sentence, which would delight the heart of a German professor. "And flie the vnlearned as a pestilence in a commune wealth. As simple women, carpenters, pewterers, brasiers, sopeballesellers, pulters, hostellers, painters, apotecaries (otherwise than for their drogges) auaunters themselves to come from Pole, Constantinople, Italie, Almaine, Spain, Fraunce, Greece and Turkie, Inde, Egipt or Jury; from ye

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Almanack calculated for New England, by Dr. Pierce, Mariner." (1639) and this pioneer was followed by a host of similar productions. Perhaps the most famous of these was the "Poor Richard" of Benjamin Franklin, which appeared at Philadelphia in 1733 and was continued until 1767. (H.)

[1] The last indictment is at least as old as Martial (A. D. 80), who furnishes the following epigram:

"Nuper erat medicus, nunc est vispillo Diaulus:
Quod vispillo facit, fecerat et medicus."

"Diaulus was a doctor; an undertaker now,
His title, not his work, is changed, all must allow." (H.)

seruice of Emperoures, kings and quienes, promising helpe of al diseases, yea vncurable, with one or twoo drinckes, by waters sixe monethes in continualle distillinge, by Aurum potabile or quintessence, by dryngkes of great and hygh prices, as though thei were made of the sunne, moone or sterres, by blessynges & Blowinges, Hipocriticalle prayenges & foolysh smokynges of shirtes, Smockes and kerchieffes, wyth suche others theire phantasies & mockeryes, meaning nothinge els but to abuse your light belieue, and scorne you behind your backes with their medicines (so filthie that I am ashamed to name theim) for your single wit and simple belief in trusting them most whiche you know not at al and vnderstand least: like to them whiche thinke farre foules haue faire fethers, althoughe thei be neuer so euil fauoured & foule: as thoughe there coulde not be so cunning an Englishman as a foolish running stranger (of others I speake not), or so perfect helth by honest learning as by deceiptfull ignorance. For in the erroure of these vnlearned reasteth the losse of your honest estimation, diere bloudde, precious spirites and swiete lyfe, the thyng of most estimation and price in this worlde, next vnto the immortal soule." (H.)]

Though, as we have seen, the physicians, who were regarded simply as such, during the 16th century were not ashamed to hold their daily "Brunnenschau", yet, on the other hand, they scorned all surgical or obstetrical practice, like the Arabians, still considering it unbecoming their dignity. Thus it resulted that in many places the despised Jews, who, in a most Christian way, were now shut out of the universities and thus excluded from the higher walks of the medical profession, to which they in the Middle Ages so frequently devoted themselves—these Jews, I say, were considered the only persons mean enough to practice surgical operations. This was the case in Silesia and in many other places.

The students of noble birth, who at this time crowded into their places in the universities, may be looked upon as a compensation of very doubtful value, and certainly of no higher value than that of the Jews whom they displaced. They were distinguished for their rudeness, their ignorance, and still more for their unfounded pride. Yet seats separate from those of the commonalty were given to them in the colleges, and, in order to satisfy their noble bringing-up and habits, a fencing- and dancing-master for the university were employed. Most of them, however, remained rude and dissolute, and they were, therefore, unwelcome students in all the universities. They were students merely because robbery was out of fashion, and practised duelling out of pure fondness for fighting and as a compensation for mediæval feuds. Fighting, especially towards the close of the 16th century and in the beginning of the 17th, became the fashionable folly of the better classes, and even Harvey in his youth fell into the bad habit. Even at the present day too it is not entirely overcome. The fashion originated in Italy and spread thence over France to the North.

That surgery remained in the hands of the lower class of practitioners was due, as we know, to the mediæval injunctions of the Church, which for a long time after (indeed almost into the present century) exercised its influence in this direction. The Holy Father, unfortunately, had not in the 16th century yet issued his "indulgence" for the practice of this art in Germany! (Probably no money had been offered him. After the Tetzel[1] affair, however, the price-current of indulgences fell in Germany, so that now no one felt disposed to offer his Holiness anything). Enough—the surgical indulgence was given by the Holy Father to the French alone in the year 1579, and through it the French surgeons gained greatly in the eyes of their countrymen.

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[1] Johann Tetzel (died 1519) was a Dominican monk appointed by pope Leo X to sell indulgences in Germany. It was against his practices, directly, that the famous *theses* of Luther, nailed to the church door in Wittenberg, were aimed. (H.)

In the good-fortune of procuring for the French surgeons this indulgence the famous Faculty of Paris had the chief share. In 1505 they succeeded in taking the barbers into their bosom, and thus vexing the souls of the surgeons of the Collége de St. Côme. They instructed them in the French tongue in anatomy, and gave them the honorary title of "Tonsores chirurgici", "barber-surgeons", in return for which they were required to promise to employ no internal remedies, and always (in fact the chief point) to consult with a Fellow of the Faculty. The Collége, on the other hand, vexed the Faculty sorely again by managing in 1515 to have its tribute to the Faculty remitted, and its Fellows by a resolution of the University — distinct from that of the Medical Faculty — named "Scholars" of the University.

Once more too the Medical Faculty was notably excited, when under Francis I., by the mediation of Guillaume Vavasseur (1544), the Collége was authorized to grant academic grades, Surgeon, Licentiate and even the "Doctor Chirurgiæ". In 1551, however, the exertions of the Faculty were again triumphantly successful in subjecting the surgeons to their control. From this yoke they were freed by the above mentioned indulgence, and by the renewal under Henry III. (born 1551, murdered by the Dominican Jacques Clement in 1589), Henry IV. (born 1553, murdered by Ravaillac in 1610) and Louis XIII. (1601–1643) of their privileges granted in 1515 and 1545, and this vexatious and wearisome quarrel of the doctors was thus about ended. The apple of discord, the barbers, now stepped into the background.

The French surgeons accordingly stood in fair esteem, though they still remained often devoid of literary education, acquired most of their technical knowledge from "Masters" and were compelled to work up from the bottom. It was not until towards the end of the 16th century that they began generally to receive education in the Collége and the Hôtel Dieu. A few, especially the powerful surgeons-in-ordinary, were possessed of large influence. Of these ordinary surgeons the king had twelve. Their pay, however, amounted annually to only 100 francs, except that of the "First Royal Surgeon," who also treated the venereal diseases of their majesties.

In the numerous foreign and domestic wars carried on at this period by and within France, the surgeons had rich opportunities to enroll themselves as field surgeons. This enrollment was always made for a single campaign only, and by the commander of the enlisted troops. On the completion of the campaign they became again private surgeons. In Italy the cultivation of surgery lay chiefly in the hands of the great anatomists. It was also taught in the universities, that is lectures were delivered upon the subject of surgery by the professors of anatomy. The same thing was done in Vienna after 1555, in imitation of the Italian example. The first professor who lectured on surgery in the latter city was Franz Emrich, who, like a jolly Viennese, founded a pleasant banquet to his own memory.

[In the English army the inferior surgeons were often impressed into the service, and their pay in 1514 was 6d. to 8d. a day, the same as an archer. According to the law of arms they were "unharnessed" in the field. The character of the surgical talent obtained by the munificent pay mentioned above may be learned from the account of the famous surgeon Thomas Gale, who writes: "I remember when I was in the wars at Montreuil (1544), in the time of that most famous Prince, Henry VIII., there was a great rabblement there that took upon them to be surgeons. Some were sow-gelders and some horse-gelders, with tinkers and cobblers. This noble sect did such great cures that they got themselves a perpetual name; for like as Thessalus' sect were called Thessalions, so was this noble rabblement for their notorious cures called dog-leaches; for in two dressings they did commonly make their cures whole and sound for ever, so that they neither felt heat nor cold, nor no manner of pain after. But when the Duke of Norfolk, who was then general, understood how the people did die, and that of small wounds, he sent for me and certain other surgeons, commanding us to make search how these men came to their death, whether it were by the grievousness of their wounds, or by the lack of knowledge of the surgeons; and we, according to our commandment, made search through all the camp and found many of the same good fellows which took upon them the names of surgeons, not only the names, but the wages also. We asking of them whether they were surgeons or no, they said they were: we demanded with whom they were brought up, and they with shameless faces would answer either with one cunning man or another which was dead. Then we demanded of them what chirurgery stuff they had to cure men withal: and they would show us a pot or a box which they had in a budget, wherein was such trumpery as they did use to grease horses' heels withal and laid upon scabbed horses' backs with verval and such like. And others that were cobblers and tinkers, they used shoemakers' wax with the rust of old pans, and made therewithal a noble salve, as they did term it. But in the end this worthy rabblement was committed to the Marshalsea and threatened by the Duke's Grace to be hanged for their worthy deeds except they would declare the truth, what they were and of what occupation, and in the end they did confess as I have declared to you before."

In the latter half of the 16th century native English surgeons seem to have been scarce, for the same Gale says: "I have myself in the time of king Henry VIII. holpe to furnish out of London, in one year, which served by sea and land, three-score and twelve surgeons, which were good workmen and well able to serve, and all Englishmen. At this present day" (when he wrote, say 1586) "there are not 34 of all the whole company, of Englishmen, and yet the most of them be in noblemen's service, so that, if we should have need, I do not know where to find 12 sufficient men. What do I say? sufficient men? nay, I would there were 10 among all the company worthy to be called surgeons." H.]

That there were famous surgeons too in Spain, which at this period was still progressive in its tendencies, and that patients at this time, in spite of remote residence and poor means of communication, went to visit the "famous" surgeons, is proven by the example of Arcæus. However, at that period such conduct is easily explained, for the celebrities were not then so numerous as to-day, when every university or larger city has several coryphæi for life.

The Germans in the 16th century had still but few proper Wundärzte — also called Schneidärzte — i. e. surgeons educated in schools or by able masters, improved by travel, especially in foreign lands, and thoroughly versed in the science and surgical technics of their time. The few to be found were either educated in Italy or France, or were self-taught, as the result of an extraordinary genius for their calling. For in surgery the latter has ever been of much greater weight than in medicine, which demands rather a systematic mass of scientific information and formulæ. Most of these surgeons remained settled in large cities, e. g. in Strassburg and Basel (two cities which formed a kind of surgical center), and in Worms, Frankfort, Dresden etc. Even when they changed their residence, it was done rarely, and with the view of a better and more suitable sphere of labor, not from love of, and the necessity for, a change.

They devoted themselves chiefly to the greater operations, but also attended to ordinary surgery, though their department was strictly divided from that of the physicians. City-, body- and court-surgeons, as well as higher military (wound-) surgeons, sprung often from this class.

In general, however, surgery in Germany still lay almost entirely, or at least chiefly, in the inferior hands of the itinerant herniotomists, tooth-drawers, couchers for cataract and barbers, whom the obscene Theophrastus von Hohenheim calls "Arschkratzer." They carried their dressings for wounds in brass boxes, which the author has himself seen. The bath-keepers gradually died out. These itinerant surgeons, mostly ignorant and rude journeymen, practised constantly in the country and at the annual fairs, perpetrated the same evils, and exercised the same deceit, as they did in the heart of the Middle Ages. Many of the better surgeons too, either voluntarily or perforce, trod in the same steps, and were distinguished from their questionable colleagues simply by a more decent, and better, practice. Thus from these despised circles proceeded frequently a good surgeon, just as many a great actor has descended from a travelling theater. The better class of inferior surgeons remained stationary and formed the so-called "Meisterärzte." Persons of this class filled the positions of city- and body-barbers, and had journeymen and pupils. The "Pest-barbers" were also a class of physicians still existing in almost all cities. "Pest examiners" from this class were also to be found. These were stationed at the gates of the city to examine strangers and learn whence they came. If the latter could not prove that they had not been in any plague neighborhood for the last forty days they were sent away. The itinerant fellows, of whom we shall speak hereafter, were called "Marktärzte". The dividing line between the superior barbers, the Wundärzte proper and the itinerant lower surgeons, was, however, in Germany always uncertain, so that the different titles were employed promiscuously. The guild-surgeons in Germany were not allowed to practise unless they had made their "Meisterstück", and the same was the case in France and Italy. The guild examination consisted mainly in answering questions upon all the traditions of the art. "Such questions and Meisterstücke are found written or printed in many places, and many persons learn them by heart, just as the nuns do the Psalter. In this way they stand their examination very well and are received as "Meister", although they have neither seen nor practised any surgery" (Würtz).

The pay of the Wundärzte was generally good, for the surgeons always demanded more respectable pay, and guarded the honor of their profession more carefully in this respect, than did the physicians. A Brandenburg body-surgeon e. g. received free board, a glass of wine daily, two court suits annually, and every five years a festive dress, together with a salary of 103 marks ($26). Besides this he had at his disposal "Knechte"—the surgeon's assistants were so called at this time — who were also boarded free of expense and even received 14 marks ($3.50) annually as wages. Each "Heften" (as we should say to-day each needle) was charged separately, in accordance with the maxim "viel Häfft (Nähte), viel Geld", though this kind of computation was criticised occasionally, since it gave occasion for the insertion of a larger number of stitches than was necessary. The care of a broken bone in some places was paid by a fee of 42 marks ($10.50). In Nuremberg from a remote period, in cases of exorbitant charge, the "sworn" surgeons formed the court of last resort. In this city the barbers, bath-keepers and surgeons were annually sworn to assist everyone who requested their aid, by day or night, with surgical dressings, bleeding and everything which pertained to their art, and, in cases of dangerous wounds, to call in a sworn physician and sworn representatives of their own occupation. Internal medication, especially the administration of strong purgatives and clysters or other evacuative drinks, was forbidden to them under the penalty of 21 marks, 45 pfennige ($5.45), for each offence. They might also receive from the council corporal punishment. Only in venereal troubles, wounds and other infirmities, for the healing of injuries, wounds, stabs and for the discussion of abscesses and buboes, were they permitted to prescribe vulnerary and lenitive potions. In dangerous and malignant troubles, however, especially in women, they were permitted to prescribe only upon the advice of a doctor. They were protected against itinerant herniotomists etc. and other vagabond quacks, who kept petroleum and other salves and oils for sale. (E. Solger.)

Surgery in Germany naturally passed for a "disreputable" handicraft, in even the eyes of the law, until Charles V. in 1548 declared it "honorable"', an edict so little heeded, however, that Rudolph II. (1552–1612) was compelled in 1577 to renew it.

"He who dealt with felons, e. g. the barber who shaved the offender or prepared him for his last journey, was regarded as disreputable. So too the barber or surgeon who dressed the wounds of him who had been tortured on the rack, or who aided him in any other way, was regarded as "disreputable". (F. W. Hahl, "das deutsche Handwerk", 1874.)

Doubtless also the surgeons, or those who professed to be, and who passed for such, may have fallen into the drunkenness of the age and into still worse vices, for in all the surgical text-books of the period stress is laid upon regularity of life as a chief requisite. Yet probably matters were so very bad in special cases only, and the evil was made so prominent because it affected with special unpleasantness the better class of surgeons, who advocated with their whole influence a better position for their profession, and expected and desired this from the rabble, who speculated at most in external, never in internal honor, and over whom they towered so high. In consequence of the numerous and great abuses, it was established by an imperial decree in 1580 that "no barber or surgeon should practise surgery unless his dexterity had been previously well examined into by Medici and experienced surgeons, and the fact established by witnesses." (Frolich.) This, however, like most imperial decrees, remained a dead letter. The situation of operative opthalmology and obstetrics, however, if the accounts handed down to us are only half proportioned to the truth, must have been veiled in the deepest shadows. "Peddlers of theriaca, tooth-drawers, vagabonds or other loose and wanton fellows", in booths at the annual fairs or without ceremony in the squares, without the slightest knowledge of the diseases and the anatomy of the eye and with inferior instruments too, operated upon every one who would permit, or who asked for it, couching cataracts — at 30–60–120 pfennige (7–15–30 cents) apiece ![1] After the operation was performed, or after the close of the fair, when nothing more could be made, these "Couchers" (who better deserved the name of eye-stickers and blind-masters), without troubling themselves further about the after-treatment of their patients, drew off "like a sow from the trough" and left them to "the Pawer or Furpech, to the shoemaker's or tailor's apprentice." Undoubtedly it was not a matter entirely devoid of danger to be unsuccessful in one's treatment in that day; for club and Lynch law, though not legalized, were regarded as permissible against physicians. Poor women in difficult labor, whom the "Hebammen" (midwives), travelling around with their instruments, had not yet assisted into eternity, were even worse maltreated by the surgeons. Such "fellows" terminated matters in the true sense of the word by dragging the dead children piecemeal from the womb with iron and hooks. Male obstetricians existed at this period — at least in Germany — only for this and similar work. That there were male obstetricians in Italy during the 16th century, who belonged to the class of regular physicians and were even professors, may be concluded from the following remark of Realdo Colombo: "I have, with my own hands, drawn not only dead, but also living, children out of the uterus of their mother, not once, but frequently, and as I did this I observed carefully the position of the womb." A few only of the better class of surgeons were acquainted with podalic version, and these scarcely ever employed it, so that it was not without reason that the poor female to be operated upon obstetrically (as well as in other major operations) always made her confession to the priest before the beginning of the massacre, in order, in accordance with the faith of the time, to save at least her soul, as the body must always perish. Indeed even more deplorable fellows than the inferior surgeons gave their attention to operative midwifery. This branch had always been partially in the same hands as the delivery of the lower animals, (and indeed with equal impropriety) is at the present day; for in 1580 it was necessary to prohibit shepherds and herdsmen from delivering women! The physicians proper (horrible as this seems), at that time and long after, held the practice of obstetrics to be unworthy of them, but prescribed, on the contrary, cordials, oxytocics etc. for parturient women, and neglected and even scorned to learn merely how to extract the dead child. That sort of obstetric butcher of which we have already made mention, and to whom boldness, at least, was probably never wanting — a swine-gelder at that time performed the first Cæsarean section upon his own wife!—was also called in to help in the extremest cases only, when the art of all the midwives of the neighborhood was at an end. Such was the case with Nufer's wife, upon whom no less than a dozen of midwives, one after another, had tried their skill. Ordinarily midwives only were admitted to the lying-in-room,[1] a custom so strongly maintained that in the year 1521 a Hamburg physician named Veithes, who dressed himself as a midwife and brought to a happy conclusion a labor which the midwives could not complete, is said to have been burned in punishment of his "sorcery". The midwives of that day entered upon their office and vocation without any other knowledge than that which they acquired from ignorant mistresses, thoroughly superstitious, rude and purely empirical in their treatment, like themselves. They "worked" in the vagina during parturition in a way to make one's hair stand on end, oiling, poulticing, fumigating etc., in order to facilitate labor; they gave all sorts of cordial and oxytocic remedies, and constantly employed the labor-stool. Nevertheless they managed to eat and drink a fair amount during the intervals of their "working". During the lying-in period too they were in the habit of feeding the mother (and above all themselves) with viands of varirious sorts, and administering (to themselves also and particularly) a considerable quantity of drink.[2] Their "Besteck" (case of instruments) was carried in a pocket suspended from their belt. In the lying-in room, as pictures of Dürer and in the work of Roesslin show, there was great noise and confusion, the result of all sorts of female fussiness etc., and the air must have been none of the best. The wife of the burgomaster of a city now and then established a kind of board of examiners for them. The midwives too, then as now, discouraged the calling-in of physicians, even in difficult cases, on the plea that they knew nothing about midwifery, in which statement, at that time at least, they were in the right. In the 16th century, however, in order to repress the evils just mentioned, ordinances for midwives began to be established, and of these the first was drawn up by Lonicerus for Frankfort-on-the Main in 1573. The midwives were sworn officials. They were permitted (e. g. in Nuremberg) to administer harmless remedies to lying-in women and to infants, though in this they must be cautious. "It was forbidden to the old women who dealt in roots and herbs to sell hellebore, laurel, (Daphne), caper-spurge (Treibwurz ?), savin and other purgative and oxytocic etc. articles, under penalty of corporal punishment." (E. Solger.) It would seem to follow from this that, in those "good old times" too, artificial abortion was not very rare. In France at this time the midwives, at least a few of them, were certainly much more highly educated, so that Bourgeois e. g. was even eminent as an authoress. [In England the practice of midwifery by regular physicians is said to have begun about the time of the founding of the College of Physicians in 1518. Perhaps the translation of Roesslin's work under the title of "The Byrthe of Mankynde, set forth in Englishe by Thomas Raynalde, Phisition" which appeared in 1540, may be taken as evidence of an increased interest in this branch of their profession by the physicians of England. Dr. George Owen (died 1558), physician-in ordinary to Henry VIII., Edward VI and queen Mary, and president of the College of Physicians in 1553, professed to have delivered queen Jane Seymour of prince Edward by the Cæsarean section in 1537, but the statement lacks all confirmation and probability. Nor is there very much evidence that physicians regularly attended ordinary cases of labor before the beginning of the 17th century. Still Harvey is known to have practised obstetrics as early as 1603, and his action does not seem to have excited surprise as anything unusual. His treatise "On Parturition," which, however, was not published until 1651, shows that the author was quite familiar with the ordinary management and course of labor, as well as that he likewise practised gynæcology. It is probable, therefore, that the custom of attending ordinary cases of midwifery grew up gradually among English physicians during the 16th century, and had become quite common by the beginning of the 17th. No public teacher of obstetrics is recorded in England, however, before Dr. John Maubray, about 1723. (H.)]

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[1] This was by no means a small sum. In England, the wealthiest of countries, a pound of pork at that time cost but little more than one cent, a fat calf 24 cents, a fat ox \$6–\$6.75; the farm-hand received 10 cents per diem, the journeyman 12 cents. A litre of wine cost in Germany 3–3½ cents, and the entertainment of the Bey of Tunis with his suite of five persons in 1548 cost the German emperor only \$1.25 a day. The annual stipend of a free student in Canterbury amounted to \$20, and upon this he was able to live. If a "coucher" too only had something to do, he did not fare badly.

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[1] The exclusion of strange men from the women, that is the ostracism of male aid in the diseases and special conditions of married women, particularly in those conditions which relate to the sexual sphere, is found among almost all races and people not enlightened by civilization. It is an evidence of the natural tendency of feeling and action on the subject of coition or generation, and is by no means an evidence of high moral conceptions, still less of high morality or even modesty.

[2] Genuine prototypes of the "Mrs. Sarah Gamp" of Dickens, whose antitypes of the present day are found in the acquaintance of every practising physician. Happily our schools for nurses are gradually replacing these old-fashioned "monthlies" with better material. (H.)

A special class of state-physicians did not exist in the 16th century. The duties of such officials, which, in contrast with earlier times, at the end of the century were increased occasionally by that of making judicial autopsies, were still performed by the body-physicians and city-physicians, or by the city- and body-barbers, who, as well as the ordinary physicians, were sworn for each case.

The regulations prescribed by the cities in times of pestilence were very strict. Boards of health were frequently convoked and strict health ordinances issued, even in Rome under Sixtus V. in 1588, while Hadrian VI. regarded all preventive measures as impious. "It was forbidden to attend foreign markets and fairs. Whosoever, however, did attend fairs must undergo quarantine, the guard of the gates was strengthened, suspected persons were not admitted, strangers must bring evidence that they had not sojourned in places afflicted by the pestilence; "Blotterhäuser" were built, the attendants were forcibly impressed into service as nurses, the sick were shut up in their houses, suitable directions as to mode of life, even as to purification of the washings of the body and bed, on interment etc., were published.— The council sought to suppress the use of secret remedies, sorcery and coscinomancy: amulets (Passauer Kunst) were interdicted and burned. The streets must be kept clean" etc. The physicians, at the demand of the authorities, also decided cases of doubtful sex. Hermaphrodites ran considerable risk. One who was baptized Elizabeth, but, on the decision of a doctor, re-baptized privately in 1527, and yet afterwards performed the functions of a woman, was burned. Physicians who, through ignorance or carelessness (but not intentionally), killed a person with medicine, according to the criminal code of Charles V. were punished in accordance with the counsel of those skilled in medicine.

In 1582 also there was introduced in Augsburg a "Collegium medicum", which was also an institution for instruction. "The genuine Augsburg Medici of this place, at the especial instance of Dr. Lucas Stengling, an experienced and learned man, in order to distinguish themselves better from the quacks and other impostors who boasted of their medical art, with the approval of the council, associated themselves into a College, and made also a special medical ordinance and statutes." There were too, even in the 16th century, so-called "Landschaftsphysici", i. e. physicians employed by the states of a province, and often provided with even very high salaries. Thus in the year 1555 Martin Stopius of Vienna was appointed to the district over the Enns with a salary of 600 marks ($150), and Matth. Sabisch with a salary of 570 marks ($142) for three years, with the right to six months' notice before the termination of the engagement. About the same time Dr. Friedrich Lagus and the same Stopius, by reason of their long service there, were allowed 171 marks ($43) for provisions annually, while a certain Matth. Anomaus "by reason of his previous service," and in the expectation that he would interest himself in school matters until his actual appointment, received a remuneration of 171 marks ($43). The latter was actually appointed to the position in 1583 with a salary of 600 marks ($150). These physicians were required to render aid to the "Landesmitglieder" and their subjects, and, when requested, to travel through the country, for which latter service they were authorized to demand one mark (24 cts.) for each mile of travel, 1.71 marks (43 cts.) for each day spent with the sick, and their subsistence." In the same year Bartholomæus Schoenporn was called to Linz as "Landschaftphysicus", and, in addition to his regular salary of 600 marks, received a bonus of 300 marks, because he had more business in this city. Besides this his travelling expenses were repaid to him, and he received 300 marks to purchase a horse. In 1593, "in order to prevent disputes", only 513 marks were paid to each of the Landschaftsphysici. In this year Doctor Lagus was pensioned with 600 marks, and Doctor Springer appointed in his place with a salary of 513 marks. Another Landschaftsphysiker, Johann Attemstetter, even received 1200 marks ($300) annually, "because he had resigned his good service with Duke William in Bavaria." In 1569 the states had also commissioned a special surgeon Horstauer. One of the medical ordinances runs: "No one shall be permitted to practice as a doctor who has not been examined in Vienna, and who is not provided with testimonials. In like manner no one shall be admitted as an apothecary, surgeon, barber, bath-keeper, lithotomist, herniotomist, oculist and "Franzosenarzt" (specialist in venereal disease), who has not been examined by the "Landschaftsphysiker" and is not provided with testimonials. The examination must take place in the presence of a Landherr or of a member of the council of the place in question, together with a sworn notary or state-secretary. The testimonials shall be laid before the state commissioners. The apothecaries were to be sworn, to be sober persons, and the physicians were expected to watch over this matter. No city could have two apothecaries, and no practising physician could own an apothecary-shop. No medicines were to be delivered without a prescription, and the physicians must not give to their patients any medicines not purchased from the apothecaries, nor specially recommend any pharmacy to the sick. Monasteries were allowed pharmacies for their own use alone. To root-peddlers and itinerant dealers the sale of harmful articles was prohibited. Confections unfit for eating were also prohibited. Surgeons, bath-keepers etc. were not allowed to treat the sick and midwives, female inspectors (Beseherinnen?) and Jews could not prepare drugs, unless the Jews were baptized and examined. The price must be marked upon the prescription. Some one must be always present in the apothecary-shops. Prescriptions must be kept secret." (Ulrich.) All these directions point to the modern style in medical matters (if we except the irregular practitioners), and are evidence how high was the grade of civilization in Germany prior to the Thirty Years' War.

The system of military hygiene of the infantry (Landsknechte) of the period enjoyed a relatively good organization. At its head was placed in each so-called "Hauffen" of 5,000 to 10,000 men one "Obrist-Feldartzet", who was an educated physician, like the captain, quartermaster and commissary was counted among the superior officials, and, as a member of the staff of the commander, was expected always to keep in the vicinity of the latter. To him, as to the more highly educated physician (more rarely to a higher Wundarzt) were subordinated the "Feldscheerer", of whom there was one to every 200 cavalry or infantry. The "Obrist-Feldartzet" was expected to give aid and counsel to the "Feldscheerer" in the performance of operations, in the transportation of the wounded, in cases of sickness etc., as well as to superintend the "dragging out" of the dead and wounded from the line of battle. Each Feldscheerer too had one "Knecht" (assistant) at his side. Feldscheerer and Knechte, especially the latter, went when necessary into the midst of the troops, i. e. the combatants, in order to help them quickly. They also carried drugs, instruments etc. with them, and these they were expected to keep in good condition at their own expense. The "Oberst-Arztet, who must be a doctor, or otherwise a man of official authority", was required to direct his special attention, in his prescribed monthly inspection, to the performance of these duties. In the cavalry, to each squadron of about 2000 men two surgeons were allotted; in the artillery ("arckeley"), one surgeon and one Knecht.

When the army was settled in camp a pennant[1] marked the place where the Feldscheerer was stationed. By night he was near the "Fendrich" (ensign), but during the battle, in the "Hinterhut" (rear-guard), when not actually engaged in the ranks.

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[1] With this diminutive term was designated a gigantic signum belli, in which the standard-bearer could wrap himself up several times if he was in danger, though only to die in it.

During the stay of the army in camp the sick and wounded were collected in a special and isolated tent — a sort of Roman field-hospital — and nursed by the baggage-women and young men, who together frequently almost equalled in numbers the actual fighting strength of the army, and whom the rude Landsknechte designated shortly, but probably quite justly, as "whores" and "boys". For these priestesses of Venus of the lowest sort there was a special "Hurenwaibel" (whore-sergeant !). On long marches the wounded were carried along in wagons, or, under charge of a "Spittelmeister" (hospital superintendent), left behind in villages or cities. The expense of attendance upon those thus left was defrayed by a deduction from the regular pay of the Landsknechte for this purpose.

In great contrast to the times of Chauliac, when drinks, charms etc. and hot oil poured into wounds made up the whole of military surgery (an art practised at that period chiefly by Germans, but also in the French armies), regular sanitary regulations already existed. Yet the "weapon-salves"[1] of course still enjoyed great esteem. These, however, were of assistance only when the weapon inflicting the wound had been preserved, and when neither the heart, the brain nor the liver, in a word when no vital organ, was injured, in which cases aid was of course easy. The weapon was then anointed daily, or every second or third day, wrapped in clean linen and kept in a warm place, free from dust and wind etc. The weapon-salve of Paracelsus may serve as a specimen of one of them. It consisted of the fat of very old wild hogs and bears heated half an hour in red wine, then dropped into cold water, which was next skimmed and the fat rubbed up with roasted, but (for heaven's sake!) not burned angle-worms and moss from the skull of a person hung, scraped off during the increase of the moon, to which were added bloodstone, the dried brain of the wild hog, red sandal-wood and a portion of a genuine mummy!! This genuine mummy-flesh was kept by apothecaries even as late as our own century. Charms too were still often regarded as efficacious in the treatment of wounds, and were said by old women in cases of disease. Some of these are frequently made use of, word for word, even at the present day.

The engagement of the medical staff for the army was the business of the commander, who, indeed, had to enlist the entire contingent. The belligerent parties made contracts with him alone, and he, on his part, made the final contract with his subordinates.

The "Oberst Feldartzet" of infantry received as pay about $17 per month; the surgeon of cavalry the same; the surgeon of artillery, $13 for himself and his assistant, together with $9 for the maintenance of two horses. The Feldscheerer received about 7–14 marks (in Saxony 30 marks), but might treat civilians and might demand special pay from the Landsknechte for services not strictly in the line of his official duty. All disputes between the two latter parties were to be arranged by the "Oberst Feldartzet." In fortresses and in cases of siege, the physicians resident in these places or their vicinity were employed as "Festungsmedici", i. e. garrison-physicians.

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[1] Perhaps the most popular of these was the "Sympathetic Powder" of Sir Kenelm Digby in the following century. It is said to have been simply calcined green vitriol. In cases of wounds this powder was to be applied to the weapon by which they were inflicted; this was then covered with ointment and dressed two or three times a day. The wound meanwhile was carefully bound up with linen bandages and thoroughly — let alone for seven days. (H.)

In France Henry II. (1518–59) and Henry IV. organized field-hospitals and field-pharmacies, over which latter field-pharmacists presided.

The civilian colleagues of the latter, the ordinary apothecaries ("appentegker"), were in the 16th century quite numerous, in accordance with the number of the newly established pharmacies, which had already reached the lowlands. Nevertheless this period, in contrast to earlier times, was relatively unfavorable to the apothecaries, at least to the bad fellows among them; for, in consequence of the unheard-of increase in cities and states, innumerable ordinances for apothecaries sprung into existence everywhere. These, as has naturally been the case with other "ordinances" up to the present day, contained chiefly threats of punishment for transgressions of the law and for falsification of drugs, with definitions of the allowable substitution for rare, difficult to be obtained or expensive remedies, price-lists etc. Such ordinances for apothecaries — at that time mostly called "Eydt", or in Suabian Aydt — appeared for Annaberg e. g. in 1563, for Hesse in 1564, for the electorate of Saxony in 1573, for the province of Mecklenburg in 1580, for the earldom of Henneberg in 1596. According to the latter of these ordinances, the apothecary himself must swear obedience to the magistracy and to the medici, to follow the "ordinance", to exact nothing improper from his assistants, but, on the other hand, to keep them to their duty; while the apothecaries' "Gesellen" (apprentices) promised "to be honest, pious, true, as well as obedient and respectful to the physicians and to their masters, and also to follow the prescribed articles. Finally the (apothecaries') "apprentices", if old enough, took the following oath: "I promise and swear to strive after all fear of God and honesty" — the apothecaries at that time, early as it was, seem to have behaved like sinners — "to exercise myself in Latin and in grammar" etc. However the physicians very frequently prepared their own medicines.

[William Bulleyn (died 1576), of whom we have already made mention, gives the following rules for the guidance of English apothecaries:

"THE APOTICARYE

1. Must fyrst serve God, forsee the end, be clenly, pity the poore.
2. Must not be suborned for money to hurt mankynde.
3. His place of dwelling and shop to be clenly to please the sences withal.
4. His garden must be at hand with plenty of herbes, seeds, and rootes.

5. To sow, set, plant, gather, preserve and kepe them in due tyme.
6. To read Dioscorides, to know ye natures of plants and herbes.
7. To invent medicines, to chose by coloure, tast, odour, figure &c.
8. To have his morters, stilles, pottes, filters, glasses, boxes, cleane and sweete.
9. To have charcoles at hand, to make decoctions, syrupes &c.
10. To kepe his cleane ware closse, and cast away the baggage.
11. To have two places in his shop—one most cleane for the phisik, and a baser place for the chirurgie stuff.
12. That he neither increase nor diminish the phisician's bill, and kepe it for his own discharge.
13. That he neither buy nor sel rotten drugges.
14. That he peruse often his wares, that they corrupt not.
15. That he put not in quid pro quo without advysement.
16. That he may open wel a vein for to help pleuresy.
17. That he meddle only in his vocation.
18. That he delyte to reede Nicolaus Myrepsus, Valerius Cordus, Johannes Placaton, the Lubik &c.
19. That he do remember his office is only to be ye phisician's cooke.
20. That he use true measure and waight.
21. To remember his end and the judgement of God: and thus I do commend him to God, if he be not covetous or crafty, seeking his own lucre before other men's help, succour and comfort."

Richard Bubham, the apothecary of king Henry VIII., was granted in 1510 an annuity of £10. Hugo Morgan, the apothecary of queen Elizabeth, received for one quarter's bill the sum of £83 7s. 8d., a large amount in those days. But among the articles charged for in this bill were such expensive articles and delicacies as: "A confection made like manus Christi, with bezoar stone and unicorn's horn, 11s.; a royal sweetmeat with incised rhubarb, 16d.; rosewater for the King of Navarre's ambassador, 12d.; a conserve of barberries, with preserved damascene plums and other things for Mr. Ralegh, 6s.; sweet scent to be used at the christening of Sir Richard Knightley's son, 2s. 6d." etc. (H.)]

The inspections, which occurred regularly and were made by physicians, seem often to have been very jolly affairs, for one held, i. e. celebrated, in the year 1574 — it must certainly have been thorough for it lasted three weeks — cost the apothecaries concerned "for eating, wine, beer and fifers" 495 marks, 40 pfennige, (about $124), which sum, computed on our present value of gold, may be estimated five times as much. Besides, even in that time, the use of copper and brass vessels was interdicted to the apothecaries from considerations of public hygiene.

According to the price-list of that day (that of the electorate of Brandenburg in the year 1574 included 1800 articles), ordinary plaster cost 1 groschen 6 pfennige; other plasters, "with pay for cutting (Schneiderlohn) when the apothecary furnished the leather," if used for

The liver	3 Gr.	6 Pf.
The uterus	3 “	6 “
The kidneys	3 “	
The spleen	3 “	6 “
The administration of an enema	3 “	6 “

though it was suggested to the rich in the latter case to go deeper into their pockets, since this “is an unclean business”. (Vid. Phillippe-Ludwig, whom we often follow in regard to the condition of apothecaries.)

The apothecaries of the period, especially the French, allowed themselves many serious, as well as ludicrous, adulterations and deceptions! The latter, for the administration of strengthening enemata, supplied, among other things, live hens and cockerels. These, however, they placed in the poultry-yard or roasted for their own use, substituting in their place something from their witches' caldron, in which case, as is readily understood, the inverted organ of taste was unable to detect the deceit. Again, in the exhibition of strengthening drops they brought the ducats entire — gold was considered the remedy for impotence in the male — and then put them into their pockets, instead of into the essence as they pretended &c., &c.

The veterinary profession was still exactly the same as in the Middle Ages: farriers, shepherds, flayers, executioners etc. The first class in particular were frequently formally appointed veterinarians in cities, as e. g. in Frankfort. Their pay in 1503 consisted of corn and a suit of clothing, in 1553 of the same, together with a salary of 68 marks ($17) annually.[1]

Inspectors of bread, wort and meat exercised a sanitary oversight upon the actions of brewers, bakers and butchers, as had been done also in the Middle Ages from the 11th century onward. In 1404 such inspectors were already established by law in Wimpfen. In Scotland there were also inspectors of the dead (coroners).

Bath-houses still existed. In Wimpfen the two bath-houses were to be heated twice a week for general use. The weekly rent paid by the bath-keeper amounted to 10 Batzen. “The hereditary disease”, however could not be treated in “bath-houses”. Male and female nurses were to be found in every city, and many of these, indeed, as the natural result of Protestantism, were now lay persons. Hospital matters were in a bad condition when compared with our ideas of the present day, and were left almost without exception in the hands of the religious orders. In London the first hospital for the insane was founded in 1580,[2] and from this, in course of time, the modern lunatic asylum was developed. The hospital authorities, however, had already some very judicious regulations. Thus in Strassburg in 1500 it was ordered: “Where the doctor can cure by means of diet he shall give the patients no drugs”.

A mournful side to the condition of medicine in those simple times is

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1. In 1510 Thomas Fabyan was appointed veterinary surgeon for the horses of king Henry VIII. “during good conduct”, with a salary of 12d a day — nearly twice that of a surgeon in the field. (H.)

2. The hospital of St. Mary of Bethlehem (Bedlam) was founded in 1547, St. Bartholomew's in 1546 and St. Thomas's in 1553. (H.)

revealed in the admonition of the authorities to the physicians, adopted in all the medical and apothecaries' ordinances, and warning them to treat each other with respect and to live in harmony. The same is true of the prohibition of collusion with the apothecaries for the sake of gain, the recommendation of certain apothecaries &c., &c. The apothecaries were also everywhere directed not to slander the physicians, nor to secretly embitter them against each other, nor to recommend especially any one in preference to another &c., &c.

Such truly humiliating ordinances, at least such a constant repetition of them in all the laws relating to the subject, are certainly not to be found in any other profession; and, if we admit that perverted judgment and a poor comprehension of the duties of the medical profession, on the part of the law-makers of that time (as at the present), had the chief share therein, yet there must always have been occasion given in the conduct of some of its members, which casts a mournful light upon the whole. The above ordinances indicate a condition of the relations between "colleagues" adapted to injure the whole profession at all times, and which yet, as it seems, has never been removed, at any time or by any people, through the advance of culture. Indeed culture appears, alas, to make the matter only worse! It must have been most deeply humiliating, however, to the better physicians of the 16th century that the medical ordinance of Würzburg formally exhorted the physicians to humanity: "That the sick may always continue to hope for recovery the physicians shall visit them often, and shall not relax such diligence in visiting, even when they can see actually no hope of their improvement!"

THE SEVENTEENTH CENTURX.

The course of development of individual nations, in fact of humanity in general, and with it that of the sciences, is like the pulsation of the heart, with the single difference that the individual phases of the movements of mind in history are not repeated with pulsations of regular duration, as in the heart-beats of the body. To a systole of the mind succeeds a diastole and a pause. Both the latter, however, as a rule fill long periods of history, interrupted at most by individual systolic pulsations, in order to prevent complete collapse. The advancing waves of the blood during the systole of the heart are represented, in the development of nations and of humanity, by the newly acquired truths and ideas.

A period of intellectual systole, however, extended through the first two-thirds of the 16th century. From that time began the diastole, though more in the department of politics than of the sciences.

The seventeenth century was the century of reaction against the freedom of faith and of investigation won by the aid of the Germans in the sixteenth, and which our nation strove to preserve by the sacrifice of its treasure and its blood. In the sphere of mind too it attained success; but politically the struggle brought humiliation and exhaustion. The historical consideration of the former period will, therefore, awaken bitter reflections in him who recognizes its political and national influence upon the subsequent destiny of our father-land, its people and its culture. Because we are accustomed to understand by religion, or that which the priests called religion, almost exclusively a thing of the heart and of the feelings, and alas, not like other people, a thing largely of the understanding, or indeed of politics (like the popes and the Romans), it brought upon us, as we know, the most unhappy war which ever prevailed. A thirty years' religious war visited our people, who were compelled to fight out upon their own soil not only their own religious quarrels, but also foreign political struggles carried on under the hypocritical cloak of religion, and brought them to the brink of destruction. For centuries it corrupted their very hearts' core, stamped their land into a wilderness, dismembered still further a people always sundered by ancestral dissensions and henceforth by differences of creed, and plunged them into a pauperism from which, even to-day, we have not entirely recovered, and which in its results was the more ruinous, because in this very century other nations took the lead while we went backward. The Netherlands and England through commerce and colonization,[1] France through advances in national economy and industrial pursuits, as well as by conquest (and in spite of the internal weakness induced by the expulsion of the Huguenots and the reign of royal mistresses), began at this time their career of progress.

The Christian faith, instead of the bearer of love and peace (which it never has been and apparently never will be), became once more the most unhappy apple of discord. Yet Catholics and Protestants at that time differed little from each other; for the idea of the Reformation was neither very wide-spread nor greatly developed. Whoever, therefore, desires to acquire a thorough insight into that which was called the doctrine of Christ, and to learn the objects for which it was abused, the results of its mutilation, and the means by which it was effected, to him the history of the seventeenth century offers the best, as well as the saddest, opportunity. It might readily suggest the view that the Christian religion, or rather that pretended religion which the priests in universal history have always designated as Christian, has injured mankind internally and externally, spiritually and corporeally, socially and politically, more than all the horrors of political wars and all unavoidable calamities taken together. In Germans especially, such a consideration of the history of the seventeenth century must awaken peculiar sadness, since our fatherland was specially chosen, even from the time of the conversion of the Saxons by Charlemagne (indeed it seems at *all* periods to have been looked upon), as the theatre of so-called religious wars, while other countries and other peoples, by their unity and their energy, have been able for the most part to preserve themselves from a similar fate. On the other hand, they will also learn to admire the vitality of their countrymen, who, in spite of every wretchedness and the Thirty Years' War, have remained upon the stage of history and have become honored as they are to-day!

The ravages of the Thirty Years' War, the diseases and plagues, the poverty and want and depopulation, the boundless and unbridled barbarity and immorality etc. resulting therefrom, make the seventeenth century (especially its earlier half) the most mournful epoch of German, indeed probably of all, history. "In every hamlet the houses are filled with dead bodies and carcasses, men, women, children and servants, horses, hogs, cows and oxen, beside and beneath each other, slain by hunger and the plague, devoured by wolves, dogs, crows and ravens, because there was no man to bury them." As late as the year 1792 there were still in Saxony 535 wasted and extinct villages, the relics of the Thirty Years' War. The city of Frankenthal after 1634, of 18,000 inhabitants, preserved — 324; Hirschberg of 900 retained — 60, Würtemberg of 400,000 had left — 48,000! (Haeser, vol. II.) "The religious animosity of the people goaded to the highest pitch, the selfish designs of the princes, the evil influences from without, the barbarous manners, maintained the general misery . . . . . Under the pretext of defending the faith and liberty, the struggle was carried on for superstition, avarice and revenge, with unbounded passion . . . . Of the disturbances, the dangers and the distress arising from the demands of an insolent soldiery, of the desperation induced by conflagration, robbery and deeds of violence, of the misery resulting from the plague, of the most disgusting imprints made by the rudest outbursts of Pennalism,[1] of the malignant struggles concerning religious opinions and partisan objects, those now living have no conception." (Marx.) What the Thirty Years' War had left us, the French towards the end of the century destroyed.

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[1] The noblest and most important colonies of England, in both the history of civilization and of the world, were, of course, those founded in North America.

Among the people too there prevailed, not only in Germany but elsewhere also, poverty, superstition and great rudeness of manners, while their rulers, with crass absolutism, practised almost everywhere the greatest prodigality, plunged into frivolity and became slaves of the most refined sensuality. All this was united with disgusting piousness, the superstition of alchemy etc. The continuance of the trial of witches and of the Inquisition or Jesuitism, which, along with the decay of Protestant freedom of faith, ruled this century, formed the natural correlatives in the departments of the Church and of jurisprudence.

If the sixteenth century was for our culture an epoch of joyous growth and high activity, the seventeenth, for all the reasons mentioned, was not only for our developing civilization, but also for our industries, our commerce, in a word for our prosperity, an epoch of saddest quiescence. This doubly fatal century condemned our people to continued impotence and to the scorn of other nations! And that which, in this unfortunate period and shortly after, was taken from us, we in this century and in our own day have been able for the first time to partially recover; so that substantially a partial retribution is now first taken for the injuries and the ignominy inflicted upon our country and our people during this long period of suffering.

In the scientific, but more strikingly in the medical department, Germany in the seventeenth century lost the rank which she had acquired in the sixteenth, and, while other countries were able quietly to enlarge their scientific borders, for Germany alone was confirmed the truth of the maxim that when arms clash the arts and sciences must keep silent. Even the Protestant theology was no longer developed in the spirit of the early days of the Reformation, but lapsed into Realism, i. e. into faith in the letter of the law and cant. Poetry, in which the Germans have always taken refuge when life was oppressive, and chiefly spiritual or religious poetry, together with the social romance (to both of them the wretchedness of the age served as a background) and satire, alone pointed to a better future, since the foundation was laid for that advance which the following century brought forth, while the rant and jejuneness of fashionable poetry excited opposition. On the other hand, as we shall see, great, indeed undying service was performed for the sciences, even in Germany.

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[1] That barbarous and tyrannical system under which the younger students of the universities were subjected to the abuse and even cruelty of their elders. Singularly enough the system seems to have been confined to German and Protestant universities. Its echo still remains to us in the English "fagging" and American "hazing" or "training". (H.)

The English, Italians and Netherlander's, however, who took very little part in the warlike struggles of this century, acquired, in place of the Germans, the leadership in medicine, while the French constantly lent their aid, though in a less degree.

[The remarkable development of the natural sciences and medicine in England during the 16th century can scarcely be ascribed to the quietude of an age which witnessed in its early years the long and bitter struggle between constitutional and personal government, culminating in the "Civil War" (1642), the trial and execution of Charles I. (1649), the "Commonwealth" (1649-1653), the "Protectorate" (1653-1659), the "Restoration" (1660), the "Great Plague" (1665), the "Popish Plot" (1678) and finally the transfer of the throne to the house of Hanover in 1688. Indeed scarcely any century of English history presents a scene of greater internal disturbance than that upon which we are now entering. The sudden upgrowth of an extraordinary interest in scientific matters in this period was doubtless due to a reaction against the exaggerated religiousness of the Puritans, with their unending and barren theological disputes. The better minds, surfeited with the barren polemics of theology, began with delight to turn their attention to the study of nature, which invited them into the pleasant paths of experiment and offered the reward of certainty in their labor. After the Restoration, science in London (as anciently in Alexandria) became too the "fashion". All the Stuart kings of England manifested an inclination towards science, and Charles II., who was himself something of a chemist and interested in navigation, formed no exception to this rule. An epidemic of scientific interest seized upon the court, and, as Green says, "The Duke of Buckingham varied his freaks of rhyming, drinking and fiddling, by fits of devotion to his laboratory", while the glass toys called "Prince Rupert's drops" bear witness to the scientific amusements of that fiery old cavalry officer. Of course the courtiers spread their sails to the favoring breezes of science, which even the better minds enjoyed and utilized. (H.)]

The harvest, in which our father-land took relatively so little part, was in many respects a permanent one. For its collection there arose in this century ever increasing aid in the sciences of chemistry, physics, optics and mathematics, and the natural sciences in general, as well as in the realistic, inductive and experimental principles brought forward for these sciences.

The seventeenth century, in contrast to the idealistic sixteenth, was the birthday of modern Realism in almost all departments of thought. Medicine particularly, by an adoption of the accessory natural sciences in some respects extravagant, or at least often precipitate, furnished the first examples of what we are accustomed to-day to distinguish as the "exact" method. Hence this century has become of the greatest importance in the history of the development of medicine. The simple accessory sciences began to acquire the preponderance over medicine proper, although, even at that time, most of the acquisitions and views which originated in them, and which were considered "imperishable", proved in the end to be quite ephemeral. Physicists and chemists began to have something to say in medicine, more, however, to the detriment than the profit of the latter science, since its practical object, the cure of disease and the possible methods of such cure, were frequently henceforth, as they had been in preceding ages, entirely lost sight of.

The chief excitement in the science of medicine during the seventeenth century was created by three notable medical systems — the pietistically colored Paracelsism of Van Helmont, the chemical system of Sylvius and the iatromechanical system of the physicist and mechanician Borelli.

One great practitioner, however — Sydenham — renders this century imperishable in the history of practical medicine.

Surgery in the seventeenth century assumed a less brilliant form than in the sixteenth. Still it made some practical advances worthy of notice in numerous observations and new procedures, and in the invention of the tourniquet and other mechanical aids.

Transfusion too belongs to the surgery of this century. The first transfusion of lamb's blood in Germany was performed by Matth. Gottfr. Purmann and Balthasar Kaufmann at Frankfort-on-the-Oder, in a case of leprosy in 1668.

Midwifery, on the other hand, profited greatly by the gradual transfer of the higher branches of the art into the hands of men and of educated physicians, as well as by the elevation of the lower practitioners of that art through improved methods of instruction. The memorable invention of the obstetric forceps also falls in this century.

The acquisitions of this epoch in the sphere of the facts of medicine were extraordinary, and the importance of the results of this century is, on the whole, at least equal to that of our own age, which has also so greatly advanced this very side of medicine. In some respects it even surpassed the present century. In this connection we need only mention the regeneration of physiology by the great physiological discovery of the circulation, the elucidation of the fundamental laws of generation and development in man and the lower animals, the reformation of the theories of vision, respiration and perspiration, digestion etc., the anatomical discoveries in the department of the lymph and chyle vessels, and of the thoracic duct with its place of discharge, the lymphatic glands etc., in general the increasing comprehensiveness of anatomy resulting from its closer union with physiology — in all of which advances the Germans had at least some little share.

1. INFLUENCE UPON MEDICINE OF PHILOSOPHY, THE NATURAL SCIENCES, TECHNICS AND THE ARTS.

In the culture of the 17th century, as in that of the present age, among all the departments of scientific investigation, the natural sciences unquestionably furnished the most brilliant picture, although its brilliancy was still dimmed here and there by the superstition of the Middle Ages. Accordingly that method of reasoning which we are in the habit of regarding as the scientific and only permissible method in medicine, began to manifest its domination also in this science, always so largely dependent upon the general intellectual tendencies of the age. We refer to the inductive method, the *exclusive* employment of which (as it prevails to-day) certainly implies great one-sidedness, and, from the imperfection, incompleteness and, indeed, uncertainty of many of the principles to be acquired by this method, results in losing oneself (not to say taking the wrong direction) in a labyrinth of facts, without a guide or a leader. In this, as in almost all points relating to medicine, the seventeenth century was undoubtedly the scientific predecessor of our own. Yet the deductive method, in some degree at least, still maintained its equality with its rival. It is, however, only when the results of both methods correspond that we may hope to be near the truth. The union of the two methods is yet to be accomplished.

The tendencies of the sciences in the seventeenth century, whose influence may be recognized in the medicine of that day, were partly, of course, continuations of the views of the preceding century (for a sharp line of division between the views of this and the following century did not exist), and partly new developments. Chief among these was

Skepticism, founded in the preceding century by a Montaigne and continued in the philosophy of Pierre Charron (1541–1603), the chaplain of queen Margaret of Navarre, who declared all religion opposed to healthy human reason — certainly a remarkable freedom from prejudice! Skepticism was also notably developed in the philosophy of the Portuguese physician Francesco Sanchez (1562–1632), professor at Toulouse, where, however, it was mixed with the principles of the ancient Empirics. This mode of reasoning finally reached the point of doubting the capacity of the human mind to do anything else but recognize error (and not truth also in itself). Such was the idea of Pierre Bayle (1647–1706; Dictionnaire Historique et Critique), who offered the alternatives of either universal doubt or blind faith. On the other hand, François de la Mothe le Vayer (1586–1672), with greater justice, affirmed that man must acquire religious (so-called) truths rather by the aid of special divine illumination and firm faith (Credo quia absurdum), than comprehend them by pure reason; the utmost certainty was only doubt.

Opposed to skepticism was the supernatural (theosophistic, Cabalistic, mystic) philosophy. To this school belonged Jacob Böhme (1575–1624), the son of a Silesian peasant and a shoemaker, a man entirely uneducated and therefore awkward in expression, but highly gifted and a profound thinker. He was the philosophical business colleague of the "Meistersinger" Hans Sachs (1494-1576), whom, however, he far surpassed in power of fancy and profundity of thought. The English clergyman and physician, John Pordage (died 1697), is to be classed among his followers, for then, as well as now, religious mysticism in general, together with the utmost freedom of thought, found numerous advocates in England. Among these were bishop Samuel Parker (died 1688), Ralph Cudworth (died 1688), professor in Cambridge, and Henry More (died 1687). Even the French, who are by no means inclined to the supernatural, at that period embraced in considerable numbers the same philosophy. The great Jansenist, mathematician and discoverer of the decrease of atmospheric pressure in elevated localities, Blaise Pascal (1623–1662), and his contemporary Nicolas Malebranche (1638–1715), were the most prominent of these, after whom we must place Pierre Poiret (died 1719) and his odious but (as is frequently the case) enthusiastically religious, friend Antoinette Bourignon (1616–1680) of Lille. Johannes Amos of Komna (hence called Comenius, 1592–1671), founder of the system of "Pictorial Instruction"[1] and a native of Moravia, was a theosophist and "pansophist", and a very different man from the protean Van Helmont and his son Franciscus Mercurius Van Helmont (1618–1699), who was ingenious enough to unite in one system the doctrines of Christ, Plato and the Cabala.

An intermediate position between the preceding and following philosophical systems was taken by the Dominican Thomas Campanella (1568–1639), who considered the foundations of knowledge to be, on the one hand, supernatural revelation, on the other, perception by means of the senses. He was a native of Stilo in Calabria, the author of a "Civitas Solis" (a communistic social state after the Platonic model), and a martyr to his views, in consequence of which he was punished with the rack and imprisoned for thirty years on the charges of heresy and an understanding with the Turks.

The doctrines of Francis Bacon, Lord Verulam (1561–1626; the law of the transmission and reflection of sound, 1624, is one of his few discoveries), a man who showed himself as exalted in mind as he was mean in personal character, were of the greatest importance in the development of philosophy, the natural sciences and medicine. Bacon was one of those men who form landmarks in the history of civilization; the chief defender and eulogist of the modern realistic tendencies, i. e. the inductive philosophy. He himself, however, contributed very little to the advancement of the natural sciences by his own discoveries and inventions, though he valued them so highly. He adopted sensible experience, observation and experiments, upon which he laid great stress, for the sole foundation (but not the ultimate object) of knowledge, and induction as the way and method of obtaining knowledge. In order, however, to avoid the tediousness and difficulty of acquiring knowledge in this way, he admits experiences and cases of special purity — "prerogative instances" — as types, and permits a comparison of similar phenomena and things — conformable instances — as guides upon the road to knowledge. Knowledge will lead to inventions, which increase the power of man. — "Knowledge is Power". This practical result made the most manifest impression upon him. Bacon, as Grün says, was the philosopher of patents and profit. The compass, gunpowder, printing etc. he recognized as great inventions, while, on the other hand, he placed little value upon the discovery of Copernicus, as he had little comprehension of mathematics in general. He thought that we might go from the general to the individual in order to attain discoveries, but not always conversely. The method of abstraction, however, he generally rejected. Bacon's style too often reminds us of Theophrastus von Hohenheim, though it does not possess the profundity of the latter. Many of his ideas are also obscure fancies and ruminations. — Thomas Hobbes (1588-1679) went still further into realistic philosophy, attaining complete materialism and holding everything incorporeal as unreal; while the physician John Locke (1632-1704) was an exponent of the purest empiricism. Some of his views approximate very remarkably to the mechanical theory of heat. According to him, heat is a very lively commotion of the most minute particles of a body, which produces the sensation of warmth; it also depends upon motion. According to Dr. Scholz-Bremen, Locke is also "the first who, in opposition to the mediæval scorn of the body (Luther's "Madensack"), insisted upon regimen as a matter of essential importance in the harmonious development of the mind — a genuine pedagogic reform. In this, of course, he only imitated the Greeks, though he thereby led Rousseau and the philanthropists to think upon rational hygiene." Joachim Jung (1587-1657) of Lübeck, like the recent Hartmann, a philosopher from the military profession; Pierre Gassendi (1592-1655), who held that knowledge proceeded from the senses, that matter consists of atoms and is eternal etc.; Isaac Newton (1642-1727), though in his old age he brooded over the Apocalypse, and Francis Glisson (1597-1677), professor in Cambridge, all likewise followed more or less pure realistic principles. The latter also devoted himself to metaphysical and mystical speculations, for realism or materialism and religiousness and mysticism have continued to be a genuine English medley since the days of Hobbes, Locke etc.

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[1] Anschauungsunterricht. By his "Orbis Sensualium Pictus", which was translated into eleven languages and continued unsurpassed down even to Goethe's time, he contributed largely to the education of the masses, while his "Janua Linguarum Reserata", translated into 12 European tongues (besides the Arabic, Persian, Turkish and Mongolian), formed a valuable aid to higher education.
[The "Orbis Pictus", which appeared in 1658, was the original child's picture-book. (H.)]

The opposite method of investigation, deduction, was embraced by

René Descartes[1] (Cartesius, 1596–1650), the discoverer of the laws of refraction of light, the explanation of the rainbow etc., and author of the famous proposition: Cogito, ergo sum. "Flesh and bone and blood are accidents, hindrances of nature. But the man himself is thought, the invisible Ego. This is the ultimate fact of our existence, the secret of life: I am a thing which thinks!" Accordingly he allowed true existence to conscious thought alone, and considered the latter the starting point of investigation, the objects of which were God and nature, the eternal and the temporal, spirit and reality. In this investigation he preferred mathematics and the mathematical method. In explanation of the existence and constitution of the material world he assumed that motion emanated from God in the form of "vortices" (assumed by Democritus and other of the oldest philosophers), and that it brought, and still brings, together the smallest particles, and likewise conditions the functions of bodies. Descartes was an eminent mathematician and physicist, and, with François Viète, the inventor of algebra. In opposition to him the noble Jew Baruch Spinoza (1632–1677), who was expelled by the Sanhedrim from the community of fanatical Jews to the sound of the trombone, assumed the one principle only of the eternal God, though this conception he apprehended pantheistically or monistically. God is the sole being and the Almighty Creator (Nemo contra Deum, nisi Deus ipse). That which proceeds from this one being is the world; hence God and the world are identical, a view subsequently adopted by Schelling.[2]

If philosophy in earlier epochs indicated more than any other phenomenon in the sphere of mind the general tendency of thought, which in the other sciences was often more concealed, since the seventeenth century the natural sciences have become almost equally a mirror of this tendency. In the 17th century they passed through their period of reformation and emancipated themselves from the Ancients, supernaturalism, philosophy and the authority of the Bible. As they had nothing to do with salvation one was at liberty, as Galilei thought, to consult in their study not the Bible, but the perceptions of the senses and necessary evidences. Henceforward they were founded upon observation and experiment, and henceforth too they gained the preponderance as an expression of the tendency of the age. Their position for the time being became more and more authoritative in medicine, and in fact their control was finally manifested in the same degree as had been the case with philosophy in ancient medicine.

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[1] Descartes, like Regius, held the pineal gland (hypophysis) to be the seat of the soul: that it communicated with the cerebral ventricles, the fluids of which he regarded as the substratum of the "spiritus", and that it could on its part act upon the latter, as these could act upon it. As it is the only azygous organ in the brain it must be the seat of the soul. Recently it has been established by Stieda, Leydig, H. de Graaf and Baldwin Spencer) that it was, at all events originally, an organ of the mind, and indeed one of its outposts, a so-called vertical eye, which exists still in the lower animals (mollusca etc.), but in man is a mere stunted rudiment.

[2] Schelling was a physician. Spinoza's teacher van den Ende, Ludwig Meyer, the editor of his writings, and his friend Lucas were also physicians.

Zoology and botany in the seventeenth century were extended by numerous discoveries, as well as by dissection and systematic arrangement. In the former science Wilhelm Piso (died after 1648), John Johnston (1603–1675), Olaus Worm (died 1654), Jan Swammerdam (1637–1680), a famous naturalist, savant, physiologist, linguist and poet; Franc. Redi (1626–1697), Antonio Vallisnieri (died 1730), Martin Lister (1638–1711), ordinary physician of queen Anne of England (1664–1714), and Maria Sibylla Graff, *née* Merian (1647–1717), among others, were active and zealous in the study of entomology, or that portion which relates to the history of development; while in botany Joachim Jung, Nehemiah Grew (1641–1712; "The anatomy of vegetables etc.", London, 1672), John Ray (1627–1705), Joh. Vesling (1598–1649), Robert Morison (1620–1683), Aug. Quirin Rivinus (1652–1723), professor in Leipzig, Paul Hermann (1640–1695) of Halle and the merchant Georg Eberhard Rumpf (Plinius Indicus, 1637–1706) of Laasphe near Giessen, according to others of Hanau, both of whom had long resided in Dutch India, Pierre Magnol (1638–1715), Jos. Pitton Tournefort (1656–1708), who classified plants in accordance with their flowers and differentiated their species more correctly than his predecessors, and Malpighi, distinguished themselves.[1] In both departments a zealous use was made of the microscope, though chiefly of the simple instrument, for a compound microscope constructed about this time turned out to be so large as to be quite unwieldy.

With the aid of the microscope, the author last mentioned and Grew, after the introduction of the term "cell" by Hooke in 1667, were the founders of the cell-doctrine, which has been so much extended in our own century.—The two accessory sciences of botany and zoology just mentioned did not remain without influence upon the theoretical, nosological and nosographical views of medicine in the 17th century, inasmuch as the discovery of microscopic animals awakened the same inclination to the pathologia animata, as the study of the doctrine of the fungi has produced in our own age. The first efforts at the classification of plants too, which were made in the 17th century, undoubtedly led Sydenham to study diseases as distinct species, a principle of which Schoenlein in our day has made the widest use.

Astronomy in this epoch discovered high and unforeseen laws, which in truth changed the course of the world. Among its cultivators, after the earlier Nic. Kopernicus (Koppernik, 1473–1543), whom even Luther declared a fool who wished to stand astronomy upon its head, appear the brilliant names of Johann Kepler (1571–1630), Galileo Galilei (1564–1642), the defender of the Copernican system which had been interdicted (!) in 1646, and the persecuted discoverer of the law of falling-bodies, the thermometer, the telescope, Jupiter's moons, the vis inertiæ etc.; and Sir Isaac Newton (1642–1727), whose doctrine of the action of gravity, which apppeared in 1665, marks an era in the history of natural science and is said—so simple are often the roots of great truths—to have been suggested by the falling of an apple.

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[1] To the names in the text we may add those of Mathieu de Lobel (Lobelius, 1538–1616), botanist of James I., whose activity, however, was chiefly displayed in the 16th century; William Howe (1619-1656), editor of certain of the works of Lobelius in 1655; Thomas Johnson (died 1644), who edited Gerarde's "Herbal" in 1633; Leonard Plukenet ("Phytographia" etc., 1691) and John Parkinson (Paradisus in Sole, born 1657), apothecary to James I. of England and botanicus regius primarius to Charles I., one of the best of the old Herbalists, whose "Theatrum Botanicum" appeared in 1640. (H.)

Olaf Römer (1644–1710) of Aarhuus, from the eclipse of Jupiter's moons, calculated in 1675 the velocity of light; Christ. Huyghens (1627–1695; polarization of light, pendulum clock, the satellites of Saturn); James Gregory (the telescope with a metallic concave mirror, 1663); the weight of the air was established in 1643 by Torricelli (Torricellian vacuum, barometer). Mathematics (logarithms invented by Napier in 1700) and experimental physics, the almost characteristic inventions of this age, attained by their development an influence not only upon philosophy, but likewise in medicine. Indeed, so great was their influence that an entire medical school was named after them, since the methods and results of these sciences were employed by it in medicine. Optics or the microscope,[1] an invention of the spectacle-maker Jan Lippersheim in Middelburg (1608), was also of the greatest influence in the medicine of the 17th century. According to other authorities the microscope was invented by Zacharias Jansen in 1620, immediately offered for sale by Cornelis Drebbel (1572–1634), and perfected with better objectives by Robert Hooke (1635–1702). The micrometer was invented by Gascoigne in 1639.

A permanent influence upon medicine was secured in the seventeenth century by chemistry, which in the course of this period developed energetically from its origin in alchemy into an independent science, no longer devoted solely to the transmutation of metals or the preparation of medicines. It called into existence the medical sect of the "Iatrochemists", and also influenced very considerably the theorist Van Helmont, to whom it owes the establishment of the existence of gaseous bodies (he was acquainted with the inflammable hydrogen gas, carbonic acid, and its property of extinguishing flame); to Joh. Rud. Glauber (1604–1688; Glauber's salt, 1658) it is indebted for an improvement in analysis; to Robert Boyle (1626–1691), who was particularly influential in the generalization of the inductive method and is also lauded by the English as the discoverer of the so-called law of Mariotte, it owes a scientific foundation for analysis in his refutation of the doctrine of the elements taught by the Ancients and by Paracelsus. The peripatetic Johann Kunkel von Löwenstern (1630–1703) of Rendsburg discovered phosphorus, invented red glass and discarded the alkahest (universal solvent) and the tincture of gold; while chemistry, through Ray and Joh. Joachim Becher (1635–1682) of Speyer, a physician, chemist, political economist, colonial politician and philologist, whom Stahl followed in many points, by means of the assumption of an earthy combustible matter, received the earliest hint towards the discovery of the true theory of combustion, the basis of scientific chemistry, the theory of respiration etc. The introduction of chemistry into France, a country which subsequently showed itself so fertile a field for this science, was accomplished by Nicolas Lémery (1645–1715), an Iatrochemist of Paris, and Wilhelm Homberg (1651–1715). Lémery was the first to demonstrate the existence of iron in the blood. Chemical action upon objects in order to investigate them microscopically—microchemistry — was first employed by Domenico Gagliardi, professor in Rome, who treated preparations of bone with acids. Even at that time Kunkel estimated the value of chemistry to the physician very highly. "Medicine enjoys no slight benefit from this art. A medicus cannot possibly recognize diseases and their origin by means of anatomy if he is not experienced in chemistry. Still less can he know the peculiarities and effects of medicines, or recognize the functions of the body" etc.

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[1] In 1792 a highly deserving savant, Metzger, remarked with reference to this instrument: "We would reckon magnifying glasses too among the great aids to the advance of anatomy, were their advantages not equivocal, and had not more false conclusions and errors than truth been already introduced into science by their use." With considerable limitations the same statement is true to-day.

Besides the universities, of which, through the rivalry of princes to possess the best educational institutions, and in spite of the wars in Germany and German lands, many new ones were founded, as e. g. at Giessen (1607), Paderborn (1616), Molsheim (since 1702 united with Strassburg), Rinteln (1621), Salzburg (1622), Dorpat (as a Swedish university, 1632), Tirnau (1635, subsequently removed to Pesth), Utrecht (1636), Herborn (1654), Duisburg (1655), Kiel (1665), Innsbruck (1677; had no medical faculty until 1869) and Halle (1694), the

Scientific societies and journals which arose at this period, made themselves of service to medicine both directly and indirectly. These societies at first occupied themselves chiefly with physical investigations, for which there was no opportunity in the universities, since the latter, even down to the present century, were simply institutions for instruction, and not, as at present, state institutions for investigation. As the Church at that time justly scented danger to the faith in everything which related to the natural sciences, they frequently organized as secret associations, after the model of the "Academies" founded in the preceding century (though most of the latter were public), and devoted themselves to philosophy or belles-lettres. Italy was the place of origin of these new associations, as it had been of the Academies. The "Academia degli Lyncei"—so called from its seal, which bore the image of a fox — was founded at Rome as early as 1603. An "Academia del cimento", founded in Florence in 1657, selected, however, a more appropriate title from its "experiments". In London the originally private, or so-called "Invisible Society", originated chiefly by Milton and Hartlieb 1645, was remodeled by Charles II. in 1662 into the still flourishing "Royal Society of the Sciences".[1] Its object was the increase of natural, in contrast to supernatural, knowledge, and the society acquired such reputation that even foreign savants like Malpighi sent to it their works. It was a descendant of the earlier philosophical society, an association of natural philosophers, and from 1645 forward, at the suggestion of Theodor Haak of the Palatinate who had immigrated to England, it held regular meetings. (Schaible.) In France, the "Académie"[2] was founded in 1665 by Colbert, but developed its first activity in 1699 under the Abbé Bignon, while in Germany the "Gesellschaft naturforschender Aerzte", founded at Schweinfurt in 1652 by Joh. Lorenz Bausch, Joh. Mich. Fehr, G. Balth. Metzger and G. Balth. Wohlfarth, was metamorphosed in 1677 into the still existing and praiseworthy "Kaiserliche leopoldinische Akademie der Naturforscher". The members of this society frequently had special names, as was the fashion in the silly, mystical, antiquity-aping movements of that time. Thus Kunkel was called "Hermes III."

The British "Royal Society" has published its "Philosophical Transactions" since 1665; the French "Académie", the "Histoire de l' Académie" and "Mémoires" since 1699, and the German society, the "Ephemeriden" since 1670. To these official journals, as we may call them, were added in the seventeenth century the "Journal des Sçavans" (published since 1665; its first editors were Dion. des Salles and Abbé Gallois); The "Acta Eruditorum" of the Leipzig professor Otto Menken, published since 1682; the "Nouvelles de la République des Lettres" of Pierre Bayle, published since 1648; the "Nouvelles Découvertes sur toutes les Parties de la Médecine" of Nicolas de Blegny (1697), and the "Collectanea Medico-physica" of Stephan Blankaart, published at Amsterdam since 1680. The number of printed books, even in this century, was so large that Leibnitz himself complained: "In consequence of the innumerable new books even the greatest literati cannot survey the whole field. . . . . Our scientific life has become a mere slop-shop!" What if the man had lived to-day!

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[1] "'The war (civil) had not reached its end when, in 1645, a little group of students were to be seen in London, men 'inquisitive,' says one of them, 'into natural philosophy and other parts of human learning, and particularly of what had been called the new philosophy.' . . . Foremost in the group stood Doctors Wallis and Wilkins, whose removal to Oxford, which had just been reorganized by the Puritan visitors, divided the little company in 1648 into two societies, one at the university, the other remaining at the capital. The Oxford society, which was the more important of the two, held its meetings at the lodgings of Dr. Wilkins, who had become warden at Wadham college, and added to the names of its members that of the eminent mathematician Dr. Ward, and that of the first of English economists, Sir William Petty" (Green). After the "Restoration" the two branches of the society were reunited and chartered by Charles II. under the title of "Royal Society of London for the Promotion of Natural Knowledge". (H.)

[2] The "Académie des Sciences", not to be confounded with the "Académie Française" founded by Richelieu in 1635 with the object of refining the French language and style. (H.)

The political daily press also took root in the 17th century. The first newspaper appeared at Antwerp in 1605 under the editorship of A. Verhoeven; the first in Germany ("Frankfurter Postamtszeitung") made its appearance in 1615, and was followed by the "Zeitung aus Deutschland" etc. The "London Weekly News" began its career in 1620,[1] under a system of censorship more strict than in other lands.

The arts, with painting at their head, also followed the realistic tendency of the century. Here the realistic genre and landscape painting predominated, in contrast to the religious idealism of the 16th century. "The soulless idealism was opposed by a decided naturalism. The Realists accordingly recognized only reality. They gave to genre its rights. This was parallel with the up-growth of physical-scientific movements at that time" (Dohme). In this century too painting, and particularly engraving, stood in close relations with medicine, and especially with anatomy. The Netherlandic school is to be regarded as the chief representative of the realistic painting of the 17th century. At its head stood Peter Paul Rubens (1577–1640) of Siegen, and Rembrandt, the former still preserving sympathy with the idealism of the 16th century, while the latter already points to the excesses of the new tendency. This realism has been called a Protestant principle, and idealism the Catholic, though the justice of this distinction is doubtful, for the Italians, Spanish and French were not untouched by the former. In architecture the style of the renaissance was exchanged for the more substantial *barocco*, and in music the realistic opera took the place of the church-music of the 16th century. In polite literature the realistic romance and the drama were developed. In one direction, however, the realistic 17th century differed considerably from our own: the former inclined to polymathy, the latter tends to specialism. The polymathy of the 17th century may be looked upon as the first step towards the universalism of the 18th. In politics, however, the grossest absolutism and selfishness prevailed, though the English revolution mirrored forth by anticipation the revolutionary and republican acquisitions of the following century. For while in every century the present is chiefly at work, yet the future is also prepared in all departments of activity.

While the preceding remarks exhibit, on the whole, the bright side of the seventeenth century, we must add that the deepest shadows too were not wanting. All kinds of superstition, especially alchemy, witchcraft (against which the noble Friedrich Spee took up arms frankly, though at first in vain), and the follies of the Rosicrucians were in full bloom! A "Collegium Rosianum" was formed in France at this period, and consisted of three adepts, of whom one had the duty of preserving the universal medicine, another the secret of the transmutation of metals, the third that of the perpetuum mobile — all of course absolute nonsense! However it could not well be otherwise, when even professors like Sebastian Wirdig (died 1687) spoke in behalf of divining-rods and necromancy, and his Serene Highness at Homburg in the year 1699, out of care for his subjects, found it necessary to recommend on occasion of an impending eclipse of the sun "that the cattle shall remain in the stall that the foul air may not injure them, since, during such great darkness, apoplexy, malignant fevers, pestilence and all sorts of unknown diseases threaten them" (A. Grün).

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[1] The "Weekley Newes" made its first appearance May 23, 1622, under the editorship of Nathaniel Butters, Nicholas Bourne and a few others. In France the "Gazette de France" of Théophraste Renaudot appeared May 30, 1631. (H.)

2. PHENOMENA OF TRANSITION AND SYSTEMS. ADVANCES AND LABORS IN THE PRACTICAL BRANCHES.

a. Medicine.

α. THE ARABIANS AND GREEKS.

The preponderating influence of the Arabians in the sixteenth century had become broken, although even in the seventeenth century it still continued to display some activity, as e. g. with Charles Patin (1633–1699), son of the famous Guy Patin, and in certain of the universities (oath of the professors at Helmstädt) etc. On the other hand, the Greeks asserted their power, especially in Italy and Spain, though more quietly, and mainly within judicious limits. Among the Ancients, Hippocrates, through the influence of Sydenham, attained well-deserved estimation in practice.

Galen's doctrine of qualities, and even the theory of the descent of corrosive mucus from the brain into the intestines still found their votaries, e. g. in the famous Santoro and others. Among the Galenists belong also the Spaniards A. Ponce de Santa Cruz (died 1650) and Gasparo Caldera de Heredia, the former professor in Valladolid, the latter in Seville. Hippocrates and Galen found an eminent commentator and translator in Réné Chartier (1572–1654), professor and physician-in-ordinary at Paris, who spent forty years and an entire fortune on his edition of these two authors in thirteen volumes folio. Galen found a similar advocate in Phil. Labbé (1660); Hippocrates, in the Italian Prospero Martiano at Rome (1627), and in the Netherlander Joh. Antonides van der Linden (1609–1664), professor at Franecker and Leyden. The Scotchman Thomas Burnet[1] (died 1715) published an abstract of the works of Hippocrates. In Germany Kasper Hofmann (1572–1648) of Gotha devoted himself with self-sacrificing perseverance to Galen,[2] and the same devotion to the Ancients in general was displayed by the Iatro-chemist Thomas Reinesius (1587–1667, died in Leipzig), burgomaster and physician-in-ordinary at Altenburg, who, even in the eleventh year of his age, understood Greek and Latin; Heinrich Meibom at Helmstädt; the great savant and famous physician Hermann Conring, and others. The anatomy of the Ancients found a worthy laborer at Königsberg in Professor Ph. Jac. Hartmann (1648–1707) of Stralsund, while Philip Gruling (1594–1667) in 1665 wrote a "Florilegium Hippocrateo-Galeno Chemicum Novum". The medicine of our German forefathers was discussed by Gottfried Welsch in 1668.

β. PARACELSISTS.

In the practical branches the seventeenth century was connected with the sixteenth by an abundant aftermath, which, however, produced far more tares than wheat. We refer to the degenerations and amalgamations of the genuine doctrines of Paracelsus. In fact the latter in their corruptions and offshoots attained greater popularity in this century than did the genuine doctrines themselves in that which gave them birth. Indeed, as a rule, the seed of evil contained in the doctrines of Paracelsus always produced a more abundant harvest than the good germs found therein. The doctrines of Zoroaster, the Cabala and the "Hermetic books" were revived in these corruptions, and the fanciful, speculative German race furnished, alas, the chief contingent in the support of such absurdities.

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[1] A brother of the famous bishop Gilbert Burnet. He was born in 1632, studied at Cambridge and became one of the royal physicians and a member of the Royal College of Physicians of Edinburgh. His work, to which reference is made in the text, was entitled "Hippocrates Contractus", 1685. (H.)

[2] The manuscript — 35 volumes folio, the work of 20 years — was sold in England for about 80 florins. In Germany no publisher for it could be found, for "there existed in Germany neither a literature nor literary protectors. War, the plague, famine, have destroyed everything" complains Hofmann as early as 1638 (Marx). Yet this frightful war still continued for ten full years.

Besides Fludd, who has been already mentioned and who was still prominent in the seventeenth century, Sir Kenelm Digby (1603–1665), the king's chamberlain, made himself particularly famous among the English as a (Rosicrucian) Paracelsist. He gave vogue to a sympathetic powder[1] for wounds, and wore himself out in the search for a medicine to prolong life for all eternity, while William Maxwell, with his "De medicina magnetica" (1679), was a titular predecessor of Mesmer. (His work found no publisher in England, but was published in Germany by Georg Frank von Frankenau, who taught "The Restoration of Burned Plants from their Ashes"). Maxwell taught some very curious things, e. g. that a hen's rump, stripped of its feathers and laid upon the place where a viper had inflicted a bite, would draw out the poison (Waldmann). Besides these, a common Irish soldier,[2] Valentine Greatrakes (1628–1666), attained great reputation as a layer-on of hands, and, by the use of his saliva to cure deafness and the employment of carrots and subsequent pressure of the abscesses in scrofula, came to be regarded as a better miracle-worker than the king of England himself.

This degeneration of the doctrines of Paracelsus existed in Germany also, where it found its representatives and propagators in the Wirdig already mentioned, in Rudolph Goclenius (1577–1628) professor in Marburg (weapon-salve); the savant and Jesuit — the Jesuits practised everything, even medicine — Athanasius Kircher (1598–1680); Andr. Tentzel (about 1629); Andreas Rüdiger (1673–1731), professor at Leipzig; indeed in the later and justly famous Christian Thomasius (1655–1728), and others — Paracelsists of the better class, in addition to Aug. Sala already mentioned, were Raimund Minderer (died 1621), of Augsburg, who first employed sulphuric acid and the acetate of ammonia (spiritus Mindereri), and wrote in 1620 a "Medicina militaris"; Johann Hartmann (1568–1631), of Amberg, the first special German professor of Iatro-chemistry — a synonym of Paracelsian pharmacy — in Marburg; the famous Daniel Sennert (1572–1637), who wrote six folios and vibrated between the chemical doctrines of Paracelsus and Galen, and, in accordance with the spirit of his time, believed in compacts with the devil and witchcraft; Heinrich Lavater (about 1610), who, however, was rather a follower of Galen than Paracelsus; Hiob Kornthauer (about 1622); Claudius Deodatus (about 1629), a bishop and physician-in-ordinary at Basel; Adrian Mynsicht (about 1631), ordinary physician of Mecklenburg and the discoverer of tartar emetic; and finally the enlightened, versatile and famous professor Werner Rollfink (1599–1673) of Jena, who declared against the transmutation of metals, vegetable quicksilver etc. A pious opponent of Paracelsus, and above all of Sennert, was Joh. Freitag (1581–1641) in Gröningen, whose chief weapon was the Bible

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[1] See page 466, note.

[2] Greatrakes came of a very good family, was a lieutenant of cavalry under the earl of Orrery in the army of Cromwell, and subsequently a Justice of the Peace, a position in which he acquitted himself with credit. Undoubtedly at the outset he was rather an enthusiast than an impostor. To the list of Spagyrists and charlatans given in the text we may add the names of Thomas Vaughan (1621–1666), a Rosicrucian devoted to the writings of Agrippa von Nettesheim; Robert Murray (died 1673), who, though a President of the Royal Society, was yet a Rosicrucian; Arthur Dee (1597–1651), son of the famous John Dee (1527–1608), and, like his father, a devotee of astrology, cabalism and kindred absurdities; Simon Forman (1552–1611) and his pupil Richard Napier (1559–1634); and the famous Francis Anthony (1550–1623), whose assertion of the ineffable virtues of his aurum potabile elicited a quarto volume in reply from the pen of Matthew Gwinne, the first professor of medicine in Gresham College. (H.)

In France the first Iatro-chemical chair at Montpellier was filled by Lazarus Riverius (la Rivière, 1589–1655). Among the followers of Paracelsus belonged also the Paris physician Théophraste Renaudot (1584–1653), of greater importance as the founder of French journalism, pawn-shops and intelligence-offices, than as a physician. He was followed in all his "specialties" by his son Isaac. Riverius was opposed by Pierre de la Poterie (Peter Poterius) of Angers, ordinary physician at Bologna (about 1645), who took a middle course between Paracelsus and Galen. The same was done among the Italians by Pietro Castelli (died 1656), professor at Bologna, where Fabrizio Bartoletti (1581–1630) also taught the principles of Paracelsus. The Spaniard Gasp. Bravo de Sobremonte Ramirez (born 1613), professor at Valladolid, physician to the Inquisition and ordinary physician to the king, was at least a follower of the therapeutics of Paracelsus.

The doctrines of Paracelsus received a new form in the

γ. SYSTEM OF JOH. BAPT. VAN HELMONT,

which may be regarded as a peculiar remodeling of the pantheism of Paracelsus into a mystic and pietistic system based upon chemical principles. As a savant and thinker van Helmont (1578–1644) was the embodiment of doubt in the human understanding and human knowledge, the inadequacies of which, in accordance with his pietistic disposition, he considered so many moral evils to be carefully avoided. Hence he vacillated from one calling to another, from one science to another, without finding complete satisfaction in any of them. An enthusiastic and fantastic, but upright, friend of the truth, in spite of his pietistic and ascetic vein, which he owed to the general tendency of his age and to his nationality, he was still a partisan of the theosophic and alchemistic views of the preceding century, particularly those of Paracelsus, to whom he was greatly indebted. He was an important, versatile, and in the department of chemistry a fertile genius, but not a great and independent spirit, outrunning his age or impressing upon it the stamp of his own individuality; not a man whom the masses feel constrained to follow even into error. Hence it was, doubtless, that he left behind no "School" of followers. Many of his ideas, though under different names, were revived at a later period, as e. g. that of the inseparableness of force and matter, that of the ferments etc.

Van Helmont was the genuine son of his century, at once a mystic and a realist The youngest son of a noble family of Brabant, the lords of Merode, Royenborch, Oorschoot and Pellines, he was born in Brussels and lost his father in the second year of his life. A precocious child, while yet a mere boy he entered the university of Louvain, where at the age of seventeen he had completed his studies in mathematics, astronomy, astrology and philosophy, and would even have received the degree of Magister, had he not arrived at the conclusion that this title would be frivolous, and above all that he, who was yet a student, could not be entitled to such an honor. He now went to the Jesuits, who at that time taught even magic, but speedily abandoned them and devoted himself to the study of the Stoic philosophy. Under the false idea that the Capuchin friars (mere lascivious gluttons, who consider even washing unchristian) were the true Christian Stoics, he next wished to become one of them. Once more, however, he abandoned the Capuchins and resumed his studies in law, botany and medicine. In the latter science Helmont was as little pleased with its practice as with its theory, since it proved totally unable to rid him of the itch, contracted from the glove of a scabious maiden, which he had inadvertently drawn on. At least he lapsed away to the mystics Joh. Tauler (1290-1361) and Thomas à Kempis (recently specially recommended again by Leo XIII.), by whom he was led to the conclusion that wisdom, like the grace of God, was attainable only by fasting, supplication and prayer and in poverty. Hence he scorned a rich canonicate offered him (since he was unwilling to live and acquire wealth from the sins of the people) and declined the office of imperial physician. On the contrary he chose the poverty of Christ, giving to his sister all his fine earthly possessions, for which he considered himself already indemnified by rich heavenly visions, in one of which he saw his own soul, like a great empty bladder, floating over a dark abyss. Next he started upon his travels and practised medicine as a labor of love, being unwilling to accept money from his sick fellowmen in return for so doubtful an art. He had received his degree of doctor in 1599. During the course of his travels he had made the acquaintance of a pyrotechnist, by whom he was introduced to the writings of Paracelsus. These he studied zealously, though not with blind devotion; indeed, he rather disparaged them, though he, undoubtedly, borrowed much from them. Finally, after ten years, he returned home, laid aside once more the poverty of Christ, which seems to have been no longer a source of pleasure, and contracted a discreet marriage with a rich heiress, by whom he had several children, including the editor of his writings, his son Franz Mercurius. The latter was a greater theosophist than even his father, and also devoted his attention to the physiology and pathology of speech (Marx). In Vilvorde, where van Helmont settled, he occupied himself with the practice of medicine, with chemistry[1] and with his writings, and died here of pleurisy. His posthumous masterpiece bore the title of "Ortus Medicinæ, id est Initia Physicæ Inaudita. Progressus Medicinæ novus" etc.

The system of Helmont is not free from contradictions and obscurities of reasoning, independent of its conception and its principles so repugnant to our taste. It contains also unintelligible definitions and many curious words of his own coinage, in the style of Paracelsus and difficult of comprehension. Hence, as with Paracelsus, the various interpretations of his writings vary greatly from each other. Like almost all "Systems" of medicine, that of van Helmont is valuable only as an expression of the spirit of the age, i. e. of the pathogenetic and pathological ideas and knowledge prevailing at that period.

In his doctrine of the elements Helmont differs as well from the Ancients as from Paracelsus, agreeing, on the other hand, with the Bible. Thus he regards air and water as elements, though he assigns to the former only a subsidiary rôle. From water everything upon the earth takes its origin. — The world is a creation of God, but is not to be understood as something complete in itself and finished, but rather as continually originating and decaying. — From God springs primarily the spirit of man, which, alas, became by the Fall so greatly corrupted and enfeebled that the principle next mentioned attained the upper hand, though it was and is subordinate to the spirit. Beneath the latter in rank stands the perceptive and concupiscent soul, under which again is the Archeus. The former belongs to man and animals only, the Archeus, to natural objects also. Besides the Archeus there is also "Gas",[1] which arises as an aeriform body by the influence of the Archeus upon water, and represents the active principle in the origin of things and of life, while "Blas" represents the principle of motion of the stars, and corresponds to the "Leffas" of plants, as well as the "Bur" of metals. — The Archeus of man and animals, as a whole, is like the soul as it became after the Fall through Eve, and is called the Archeus influus. Regarded as the faculty of appetite it has its seat in the spleen, but viewed as creative, active thought, it resides in the stomach. The spleen and the stomach form the duumvirate of the body. The former presides over the abdomen, the sexual organs etc.; the latter over sleep, waking, folly etc. The Archei insiti are portions of the Archeus influus, and each organ possesses its own. According to Helmont the active principle of the Archeus, in both healthy and diseased conditions, is called ferment. This is the special generative and creative principle in nature and man, and the basis of life. After death, and during decay, it escapes from the body, in order to beget new bodies. It exists also *before* the semen, has an odor, which attracts the Archeus and excites it to activity, and acts upon the ovum, but can also generate without such an organism. It is likewise the "magnum orpotet", which even from vegetable food passes into animals, and thus, as the result of imperfect assimilation, or through the deposit of injurious material in the body, also occasions diseases. The "ferment" is the chief agent in digestion, adheres to the acid of the stomach and obeys the commands of the Archeus. Of the six different grades of digestion (corresponding to the six days of creation) which van Helmont assumes, the duumvirate possesses the first; the second takes place in the duodenum by means of the bile; the third, in the vessels of the mesentery; the fourth, in the heart; the fifth, in the brain and the whole body, and consists in the conversion of the arterial blood into vital spirits; while the last takes place in the individual parts, each of which by its aid specially prepares and appropriates its nutriment. The Archeus directs the regular course of digestion by controlling the pylorus so that it opens and closes at the right time. Helmont also supposes in the blood a peculiar "latex", a fluid free from the saline constitution of the blood, and which about corresponds to the serum.

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[1] He also investigated mineral springs, and found in the water of Spaa e. g.: a mineral water and a mineral vitriol, an acid salt, immature sulphur etc.

In accordance with these cosmogenetic and physiological views, Helmont in his general pathology considers disease something active, not simply an impairment or loss of health. The general cause of disease is the Fall of Man. As regards special pathology, disease depends upon a perverted action of the Archeus, upon morbid ideas, or upon errors of the Archeus, as the result of which it sends the ferment of the stomach to improper places (the error loci of Erasistratus!). These morbid ideas of the Archeus arise, however, from its anxiety, dread, hate, terror, anger, passion etc. The Archeus influus causes general diseases, the Archei insiti, local diseases. The former, as special diseases of the Archeus, do not necessarily presuppose an external cause for their origin; the latter originate in the occasional causes, to be mentioned hereafter, and are practically more important than the former, since general diseases require no artificial aid. Accordingly fever is an expression of the sensibility of the Archeus injured by the cause of the fever. The period of chill is the expression of its passion or terror; the stadium of heat, that of its fury. On the other hand, inflammation originates in a "spina" (irritation), which springs from excitation of the Archeus, or from external causes. — Among the occasional causes of diseases van Helmont ranks demons, witches, ghosts, necromancers etc., whom he assigns to the ætiological class of "Recepta", which includes also the "Concepta" (mental causes), the "Suscepta" (external mechanical injuries), and the "Inspirata" (troubles arising from the respiration). To the class of the "Retenta" belong the "Assumpta" - causes acting from without through the digestion — and the "Innata" — the products of disease.

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[1] It is not, perhaps, generally known that we owe this word "gas" to van Helmont's fondness for coining new words. On the Darwinian theory of the survival of the fittest it seems to have maintained its existence, while its companions "blas", "leffas" and "bur" perished without, so far as I know, leaving a trace. (H.)

Van Helmont's special ætiology gives e. g. as the cause of dropsy, hindrance to the excretion of urine by the enraged Archeus In inflammation of the chest, where the blood coagulates outside of the vessels, the Archeus sends the acid secretion of the stomach into the lungs; in gout, into the joints etc. In catarrh the mucus is formed from the remnants of the food sticking to the palate; vesical calculi originate in a deposit of the urinary salts etc. "Putrefaction" in the closed lumen of the vessels he does not recognize as the cause of disease in fevers. Although van Helmont made local diseases so very prominent in his system, and therefore desired to improve the condition of pathological anatomy, still, like Paracelsus, he placed no value upon normal anatomy. — Surgery he claimed to be inseparable from medicine. He referred the origin of syphilis to sodomy with glandered horses. (Proksch.)

Although in therapeutics van Helmont laid great weight on universal medicine, conjurations, charms and prayer (so nearly related to charms), and in his pious style claimed God's mercy — certainly necessary for many of our drugs to-day too — as the basis of the efficacy of medicines, yet he did not despise earthly remedies, whose "sapores", or active principles, are contrasted with the "salia", or chemical constituents. He gives opium (to the *stimulant* effect of which he called attention), mercury, antimony, wine in fevers (alcoholic treatment of fevers) etc., and makes frequent use of Arcana. The latter, in his view, are to be considered specifically active against the wrathful, or in any way excited, Archeus, against whose discontent and ill-humor and morbid ideas in general, all therapeutics were to be directed; while the remedies first mentioned, especially those of metallic origin, act in a similar way, only not specifically. In general he lays stress upon simple chemical remedies, and abhors bleeding because of its tendency to debilitate, a tendency to which he first called attention. In the colossal abuse of bleeding which prevailed at this time, his caution on this subject merits every commendation. In the calendars bleeding, according to the rules of astrology, was preached-up as a general prophylactic until the opening of the present century.

Kunkel gives us the following comparison of Helmont and Theophrastus von Hohenheim: "Had both lived at the same time, Helmont would have treated his patients with causes and reasons, while Theophrastus, on the other hand, would have employed direct remedies. Helmont would have seen few patients, but he would have called Theophrastus rash in his promises, inexperienced in the plague, fickle in the use of medicines" etc.

If the dynamic system of van Helmont lacked the ingenious conception, the independence and the deep impress of a strong individuality, which distinguished the system of Paracelsus, yet for this reason it is more consistent, more free from contradictions and based upon a certain sum of realities; so that, regarded as a system and compared with that of Paracelsus, it involves an actual advance in scientific knowledge. In richness of ideas it also towers conspicuously above the systems which follow.—As regards its author, we must bear witness that he was a man of importance and of elevated aspirations. Especially in his conception of the medical profession was he one of the noblest men who ever lived — a man to be measured not by the sober standard of the present day, but rather by the spirit of the age in which he reasoned.

The only absolute follower of van Helmont was Franz Oswald Grembs (about 1657) ordinary physician in Salzburg, to whom we might perhaps add Jean Pierre Favre (about 1656), a physician of Castelnaudary in Languedoc. In some few of his ideas he was also followed by Walter Charlton (1619–1707) and Joh. Jak. Wepfer. The Englishman John Rogers (about 1664) accepted only five kinds of digestion, while the Jesuit Joh. Robertus (died 1651) was an opponent of van Helmont's magnetic and magic treatment.

The second theory of the seventeenth century, a theory of the fluids — humoral — which, in opposition to the preceding dynamic system, neglected the vital forces, was the so-called

δ. IATROCHEMICAL OR CHEMICAL SYSTEM

of FRANÇOIS DE LE BOË (Sylvius, 1614–1672), a Netherlander,
whose family, belonging to the emigrated nobility, resided at the time of his birth in Hanau. He pursued his studies in Paris, Sedan, Leyden and Basel, where, at the age of 23, he received his doctor's degree. Subsequently he practised with great success —he possessed in an eminent degree the "eloquence of a fine person" and wealth, with sociability and an amiable modesty!—in Hanau, Leyden and Amsterdam, until called in 1660 to a professorship in Leyden. Here he attracted a great number of pupils, chiefly by the clinical method of his instruction and the convenience of his system with its corresponding therapeutics. He died of the results of petechial fever, which prevailed in Leyden in 1668 (and was described by him!), and which had already carried off his wife and only daughter.

The "System" of Sylvius, which, like others, might rather be called a systematic phantasy, is based upon the elements of chemistry — iatrochemistry was the improved successor of alchemy and the first step toward genuine chemistry — the new knowledge of the circulation and the closer acquaintance with the chyle and lymph vessels, the pancreas and the lymphatic glands, which had been acquired in this period, as well as upon the old doctrine of the "spiritus", the "calor innatus" of the heart etc. The latter Sylvius even claimed to have felt with his finger. His system, although its author always professes to accept only "experience by means of the senses", is constructed far less upon experience, than upon false conclusions drawn from experimental observations, whose connexion with his theory is, on the whole, arbitrary and forced.

The humoral physiology of Sylvius, instead of the four cardinal fluids, adopts the "triumvirate" of the saliva, the pancreatic fluid and the bile. Instead of the varieties of the pneuma, it accepts the collective idea of the "vital spirits", which from this time forward played one of the most prominent parts, and occasioned the greatest confusion, in the theoretic views of medicine. The forces were compelled to give place to the chemical process of fermentation and effervescence, the qualities, to acid and alkali (originating in the acid or alkaline salt). Saliva and pancreatic fluid are acid, the bile is alkaline; the first effects stomach-digestion, while the two latter accomplish the [illegible]n of the chyme into chyle and fæces. In this process an effervescence occurs and produces a kind of gas, which, in the form of volatile spirit, with a delicate oil and a salt neutralized by a weak acid, enters into the composition of the chyme. Such a spirit of fermentation is also transmitted from the spleen to the blood and perfects the latter. Hence the importance of the spleen (with which the glands are connected in importance and action) becomes perfectly clear. Tho blood is the headquarters for the development of the processes of healthy and of morbid life. Normally it contains the bile already pre-formed. This is separated in the gall-bladder, but again partially mixed in the liver with the blood, whose fluidity it serves to maintain. The blood and bile then proceed to the right side of the heart, where both (together with the chyle) bring about a vital fermentation by means of the innate heat of the latter organ. In the lungs the blood of the right heart is again cooled, and passes to the left side of the heart, which, on its part, is dilated by a new "effervescence" of the blood. The contraction of this half of the heart is now excited by means of the vital spirits, and the blood is driven into the greater circulation. These vital spirits,[1] comparable in their nature to alcohol, are distilled in the brain (still regarded as a glandular organ) from the blood unappropriated in nutrition, and are carried by the nerves (at that time supposed to be hollow) to the whole body, in order to facilitate sensation. The vital spirits which reach the glands, by means of the access of an acid developed from the blood in them, undergo here their metamorphosis into lymph. Under the form of lymph they return once more to the blood, passing from the glands into the brain, thus forming a circulation distinct from that of the blood. The milk, however, which is related to lymph, originates from the blood, which, through the influence of a mild acid prepared in the mammary gland, changes its color in that organ, just as vegetable colors are changed by the action of acids.

According to the general pathology of Sylvius, health consists in the undisturbed performance in the body of the process of fermentation, without the appearance of the acid or alkaline salt.

If, however, one of the two latter salts becomes prominent, it gives rise to an acridity (acrimonia) and furnishes the cause of diseases. The individual diseases are divided into two groups: those depending upon an acid acridity, and those originating in an alkaline acridity. The two varieties of acridity, however, are subject to numerous modifications, and thus arise subordinate classes of the above groups of diseases. Hence these varieties of acridity are assigned, quite arbitrarily, both as causes of, and a principle of classification for, all individual diseases. The bile is an example of the principal humors: if it is alkaline, it occasions ardent and continued fever; if acid, it is the cause of engorgements. The pancreatic juice in a condition of acidity is the cause of intermittent fever; if it effervesces imperfectly with bile, as most frequently is the case, in consequence of the generation of acrid "vapors" (halitus), it occasions epilepsy, swooning, palpitation etc. The lymph — he was acquainted with the lymphatics of the liver—being similar to pancreatic juice, in conditions of acid acridity occasions the itch, dropsy, small-pox, urinary calculus, leucorrhœa, syphilis etc. The saliva gives rise to hectic fevers, hence — they always manifest exacerbations after eating. The vital spirits also occasion diseases (nervous diseases), because they are disturbed by the acid or alkaline "halitus", effervesce imperfectly, are totally wanting, or become too watery. He brings all diseases under two classes: diseases of the fluids and diseases of the solid parts. But with respect to the individual fluids (blood, bile etc.) and solids he carries out his classification in such a way, that he arranges the changes occurring in either so as to be cognizable by either the

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1. "Spiritus", nervous spirits, which, now that they had been banished by Harvey from the blood, were located in the nerves alone. The latter were thought to be hollow, and the "spiritus" were regarded as fluid and volatile.

simple senses (sight, hearing, smell, feeling, taste), or by the combined activity of the senses and the intellect (changes of mass, place, time, motion).

In regard to the semeiology, diagnostics and therapeutic principles or indications of Sylvius the following passage furnishes us some clues: "As often as the whole blood appears black, it indicates that acidity predominates; if the blood is redder, it shows that the bile in it is superabundant. In the first case the acid in the body and in the blood must be diminished; in the second the bile must be lessened and its power broken. If the blood, which normally is free from odor and of a sweetish taste (especially the serum), tastes salty, the alkali in the body is too pure, and, when brought into contact with the acid spiritus, engenders a humor of a saline taste and prejudicial to the body; for such a taste, though milder, may pass into the urine, but not into the serum or its products, the lymph, the pancreatic juice and the saliva. This saline taste indicates a reduction and correction of the alkali. In respect to time too the blood may be faulty, e. g. when, for some reason, the menstrual blood flows too late, after the expiration of a month, or after the fourteenth year, or when it makes its appearance too early." Fever is diagnosticated by the pulse, not by the heat of the body.

Accordingly, therapeutics has two extremely simple duties: to get rid of the acid or the alkali. The first is accomplished by the administration of alkalies, the latter, by the prescription of acids. The "effervescence of the bile" and the diseases flowing therefrom are removed by cathartics. Sylvius recommended too very highly the diaphoretic, heating method, absorbents, emetics etc., but reprehended bleeding. Opium is of service against both acid and alkali, since it tempers equally both acridity and effervescence! The general objects of therapeutics (never, alas, to be accomplished) are "to maintain the strength, to remove diseases, to mitigate symptoms and to remove their causes." — The stereotyped theory, and especially the stereotyped therapeutics of Sylvius gained for him a large following; but they also procured him numerous opponents, especially in later times, when his therapeutics were reproached with having, during their prevalence, cost, on the whole, as many human lives as the Thirty Years' War. This, under any circumstances, is an exaggerated estimate, for nature, from the most remote ages down to the present day, has preserved the sick, at least in the majority of cases, from the worst consequences of the healing art of infatuated theorists and corrupt or incapable practitioners. Zimmermann calls Sylvius (as well as Helmont and Paracelsus) an ass, in accordance with whose maxims "the retorts of innumerable men, the retorts of his children and his own retort too, were burst" (Rohlfs).

The followers of these views awakened by the advances in the science of chemistry, so convenient, especially in therapeutics, because they demanded little reflection, so fantastic and leaving so much room for the play of personal interpretation of morbid processes, and, besides all this, set forth in the form of a "System" by a famous, beloved and eloquent teacher are known collectively as

THE IATROCHEMICAL SCHOOL.

To this school is also assigned THOMAS WILLIS (1622–1675) of Oxford, ordinary physician of Charles II.,

(a man who, like Sylvius, rendered eminent service to anatomy, and especially the anatomy of the nervous system) although he set forth a theory of his own, which had only a few points of contact with that of Sylvius. Originally destined to theology, in consequence of the unfavorable conditions of that age for theological science, Willis turned his attention to medicine, and, on the completion of his studies, received the professorship of philosophy in the university of Oxford. This position, however, he resigned and turned his talents towards practice, which he pursued with great success in London until the time of his death.

Willis accepted five elements, some of which belong to the Ancients, some to the doctrine of Paracelsus and some to that of Helmont. These elements were water, earth, salt, sulphur, and spiritus. In this he differs from Sylvius, whose "fermentation" etc., on the contrary, he adopts — almost without any acid and alkali. He assigns, however, to fermentation all corporeal activity and every internal movement, and, although its seat is in the stomach and spleen, he holds that it is effected by the vital spirits generated in the brain, which latter correspond for the most part with the mercury that (according to Paracelsus) volatilizes bodies. He sharply distinguishes the animal soul from the mind proper, whose diseases he considers often dependent upon those of the former. He ascribes diseases, especially those of the blood, to "fermentation" and "effervescence", in which the "vital spirits" play the chief part. Nervous diseases also he discusses on similar principles, ascribing hysteria e. g. to a union of the spiritus with a blood imperfectly purified in the spleen, and to the false fermentation and derangement of the spiritus resulting therefrom. He advanced semeiology by a better investigation of the urine — he recognizes e. g. the sweet taste of the latter in diabetes. In therapeutics Willis opposes the "spiritus" with diaphoretics, cordials, visceral remedies, emetics and venesection.

How far even the most capable minds had sunk at this time into hoary theory is shown by Nathaniel Highmore (1613–1685), who quarreled with Willis over the seat of hysteria and hypochondriasis, the former of which he referred to filling up of the lungs with blood inflated to actual rigidity! — Besides these, the following English physicians were also partisans of the chemical doctrines: John Mayow (1645–1679), who indentified the vital spirits with the nitrogenous (nitro-aereus) particles (oxygen), and ascribed fever to the passage of these from the air into the blood; William Croone[1] (about 1664), who defended similar views. Francis Cross (about 1668), John Betts (about 1669), Walter Harris[2] (1651–1725), John Jones (about 1683), John Floyer (1649–1734), who introduced the minute watch as a means for determining more accurately the rate of the pulse, and endeavored thus to determine its frequency under various conditions of age and sex, and even in regard to mode of life and time of day. Indeed he even estimated the relation of the frequency of the pulse to that of respiration.[3] Daniel Duncan (1649–1735), a Frenchman by birth; Nathaniel Hodges (1638–1684), George Thomson (about 1670), Martin Lister (1638–1711), ordinary physician of queen Anne, William Coward (about 1695), Charles Leigh (1650–1710), William Musgrave (1657–1721), Clopton Havers, who, like Leigh, instituted researches into

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1. Founder of the "Croonian Lectures" in the Royal College of Physicians and the "Royal Society". He died 1684. (H.)
2. Author of a valuable treatise on the diseases of children entitled "De morbis acutis infantum", London, 1689. (H.)
3. Harvey had already employed it in physiological researches. From this period the minute watch maintained its position in England as an accessory means of diagnosis, though it did not come into ordinary use among other people until the end of the 18th and beginning of the 19th century.

   Floyer's work was entitled "The physician's pulse-watch", London, 1707. (H.)

artificial digestion, and made some valuable researches upon the structure of the bones (Haversian canals, 1691), and other prominent physicians far into the following century, embraced chemical views more or less altered. — The system of Sylvius or Willis did not lack powerful opponents too in England. Among these Robert Boyle, who disputed the theory from a chemical stand-point, was especially prominent, while from a practical point of view Henry Stubbes (1631–1676) attacked the Sylvian doctrine of bleeding. Archibald Pitcairn (1652–1713), a famous professor at Leyden and Edinburgh, demonstrated that the circulation was incompatible with a fermentation with effervescence, but disputed on very weak grounds the doctrine of digestion with Thomas Boer, a contemporary professor at Aberdeen. Finally John Freind (1675–1728) also entered the lists in opposition to the Sylvian doctrine of ferment

In Holland, the land of its birth, the chemical school found numerous followers, and the system was looked upon with favor by the "Mynheers". The fact that it helped them to a thriving business in tea, coffee and chocolate contributed no little to its popularity. One of the most famous physicians of that day,

CORNELIUS BONTEKOE

(Buntekuh, a name derived from that of his father's inn, his proper name was Dekker, 1647–1695), received from the East India Company a reward for his promotion of the tea-trade, inasmuch as he directed his patients to "wash away the mire of the pancreas", and with this object recommended the drinking of fifty cups of tea (or of coffee in cases of necessity) at once, or of one hundred cups in the course of the day![1] Moreover this philanthropic tea-speculator, who was called from Holland to become physician-in-ordinary of Brandenburg and subsequently professor at Frankfort-on-the-Oder, recommended constant tobacco-smoking, in addition to the use of opium, and — as a proof of what one may venture to offer mankind under the name of therapeutics — had his numerous clientèle, and indeed his medical followers. Among the latter was Joh. Abraham Gehema, his successor in the office of physician-in-ordinary of Brandenburg.

The same opinions were embraced by Theodor van Craanen (1620–1689) who was also Brandenburg physician-in-ordinary and established the systole of the pulmonary artery. Other partisans of the doctrine of Sylvius were: Jac. van Hadden (about 1660), Paul Barbette and Friederich Dekker (1648–1730), who, according to Leube, was the discoverer of albumen in the urine; Florentius Schuyl (1619–1669), professor in Leyden, who had seen with his own eyes the effervescence of bile and pancreatic juice; Wolferd Senguerd (about 1681), Jan Muys (about 1682); Ægid. Daelmans, who built up "the newly composed art of healing upon the basis of alkali and acid" (1694); Heidenryk Overkamp, who in 1681 declared Aristotle a "Hocuspocusmeester" and, according to Proksch, ascribed the origin of syphilis to the intercourse of Indians with beasts; and Stephan Blankaart (about 1691), who considered thickening of the humors the root of all evils, and therefore favored the zealous drinking of tea. — Opponents of this system appeared in Martin Schook (1614–1660), professor in Groningen; Jac. le Mort (about 1650–1718), professor in Leyden, who opposed it from a chemical stand-point; Jan Broen (about 1700); Philipp Verheijen (1648–1710), professor of anatomy in Louvain; Bernhard Swalve (about 1664), Anton Deusing (1612–1666), professor in Gröningen; Andreas Cæsius (about 1668); Willem Parent (about 1671), and most important of them all Hermann Boerhaave. The importance of Holland in the department of medicine again coincided with the general culmination of its power and culture in the age of Hugo Grotius (1583–1645), an age in which the painter Miris enunciated the maxim: "The legal foundation of property is labor". This maxim gives us a more favorable idea of the ethical elevation of his compatriots, than that of Proudhon: "Property is theft" (La propriété, c' est le vol).

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[1] Of the numerous works of Bontekoe his "Tractaat over het excellente Kruyd Thee" (1678) discusses particularly the virtues and uses of tea. (H.)

In Germany, which at that time stood in intimate relations with Holland, the chemical theory found at first followers eminent both in number and importance. At last, however, it met here its ablest and most successful opposition.

One of the most curious partisans of Sylvius was the Hessian physician-in-ordinary Joh. Doläus (1651–1707), according to whose doctrines amalgamated with the ideas of Helmont, no disease could originate without the stomach-king (gasteranax) and the heart-king (cardimelech). Fever is a false crasis of the blood, coinciding with the wrath of these kings! The Marburg professor Joh. Jac. Waldschmidt (1644–1689) of Rudelsheim in the Wetterau, saw "fermentation" everywhere, while Mich. Etmüller (1644–1683), professor in Leipzig and a less fanatical follower of Sylvius, contributed greatly to the diffusion of his system. The same statement is also true in a high degree of Georg Wolfgang Wedel (1645–1721), a famous professor in Jena. Besides these we must mention Günther Christian Schellhammer (1649–1712); the able chemist (he discovered the Berlin blue and "Dippel's animal oil") and chemical enthusiast Jos. Conrad Dippel (1672–1734) of Frankenstein near Darmstadt, in the vicinity of which city a farm[1] still preserves his memory; Eccard Leichner (about 1676); the practitioners Martin Kerger (about 1663) in Liegnitz; Rosinus Lentilius (1657–1733), physicus in Nördlingen; Hermann Grube (about 1669) of Lübeck; Eberhard Gockel (born 1636) of Ulm, who opposed the doctoring of wines with sugar of lead; J. W. von Peima, Baron von Beintema (17th and 18th centuries), imperial physician-in-ordinary; Heinrich Screta in Schaffhausen and others. All of these furnish evidence that, even as late as the second third of the eighteenth century, this theory continued to maintain its popularity in widely different countries. Even in Norway a physician Olaus (Ole) Borch (Borrichius, 1626–1690, died of lithotomy), professor at Copenhagen, appeared as a defender of the chemical system.

Among the opponents of the system were the Heidelberg professor Joh. Conr. Brunner (1653–1727), who by ligation of the pancreatic duct proved the superfluousness of the pancreatic fluid, and demonstrated further that it was not of an acid nature; Joh. Nikol. Pechlin (1646–1706), professor at Kiel and physician-in-ordinary of Holstein; the famous savant and Doctor of all four Faculties, Hermann Conring (1606–1681), professor in Helmstedt, son of a clergyman of Norten in East Friesland, educated in Helmstedt and Leyden, and equally eminent as a jurist, philosopher and theologian; the famous Johann Bohn (1640–1719) in Leipzig, who chose the path of experimentation, and greatest of all, Friedrich Hoffmann, who was originally a partisan of the system of Sylvius.

Among the people of the Romanic tongue, in France only did Iatrochemistry acquire any considerable following.

The chemical remedies alone, however, had so powerfully excited the younger Jean Riolan (1577–1657), a genuine son of his father, and his associate Guy Patin[2]

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[1] The still existing "Dippelshof", from which was derived the material for Goethe's "Erlkönig".

[2] Patin was the first who observed a case of tubal pregnancy, ascribing it to a straying of the ovum.

(1601–1672; he said of Riolan that he would rather give up a friend than an assertion), also a professor in Paris, together with Charles Guillemeau (about 1648) and Antoine Menjot, the esquires of Patin, that they even moved Parliament in order to procure a decision in favor of Galen. Parliament, however, left the decision to the Faculty, and the latter (most remarkably for that period), under the presidency of Vignon, decided for the chemical remedies (1666) by 92 voices. The opposition to the chemical system proper too on the part of Louis Levasseur (about 1668) and Charles Drélincourt (about 1680) met with no more success. In fact the number of its followers was rather increased thereby! Among these followers we may class Jean Bonet (1615–1688) of Lyons; the eminent practitioner and private teacher of Montpellier, Charles Barbeirac (1629–1699); François Bayle (1622–1709), professor in Toulouse; Nicolas de Blegny (1652–1724), originally a porter, founder of a chemical academy at Paris; François de St. André, professor at Caën, and the distinguished chemical author Jacques Minot; François Calmette (about 1677), the first to recommend a soluble mercury; Jacques Massard of Grenoble; Jean Pascal; the physicist Pierre Sylvain Regis (1653–1707), fellow of the Académie; Dominique Beddevole and Jean Viridet, both of Geneva, Reymond Vieussens, who engaged in a violent dispute with Pierre Chirac (1650–1732), originally a theologian, then a physician, and as such a professor at Montpellier, next an army-surgeon and travelling physician one after the other, and finally physician-in-ordinary at Paris. Jean Astruc (1684–1766), professor in Montpellier; Noël Falconet (1644–1734) of Lyons, a thorough partisan of Sylvius although a pupil of Patin; finally Johann Friedrich Helvetius, and numerous others. In France also the chemical system long outlived the seventeenth century.

In Italy the doctrines of Sylvius, like those of Paracelsus, found very little favor. The doctrines of the Ancients, here still in vogue, were especially opposed to the new system. Wherever the chemical doctrines found a reception, an effort was made to bring them into harmony with the Ancients, and thus to render them acceptable, so that properly speaking only

Otto Tachen (Tachenius, about 1666) of Herford in Westphalia, an apothecary, who, in consequence of theft, had become a fugitive and had then studied medicine in Padua and settled in Venice, represented the pure doctrine of Sylvius. Beside him we may range Mich. Ang. Andriolli. Luc. Ant. Portio (about 1682), professor in Rome, declared against bleeding, regarding it as an injurious operation. The following physicians endeavored to reconcile the opposing views: Luc. Tozzi (1640–1717), professor at Naples and papal physician-in-ordinary; Carlo Musitano (1635–1714), an arrogant and coarse priest (Proksch) and professor at Naples, while Pompej. Sacchi, professor at Parma and Padua, Alessandro Pascoli, professor in Rome, G. Batt. Volpini, a physician of Asti, and, most important of all, Bernardino Ramazzini (1633–1714), professor at Modena and Padua, who, like Domen. Mistichelli at Rome, applied the new theory to epidemic diseases, embraced a purer chemical doctrine. Opponents of this system were Domen. Sanguinetti (about 1699) of Naples, and Jos. del Papa, physician-in-ordinary of the Grand Duke of Tuscany. Subsequently an effort was made to bring Iatro-chemistry into accord with Iatro-mechanics.

If there were need of any special proof that medicine runs through its own phases not separately and for itself, but in conformity with the spirit of the age and its general scientific services and acquisitions; that it creates therefrom the views which from time to time control its development, we might with special propriety employ for this purpose the systems of the seventeenth century. The medical system next to be noticed is also the reflection of acquisitions of knowledge drawn by mankind from other fields. This time it was the advances in mathematics and physics or mechanics made by Galilei, Torricelli, Newton and many others, and particularly through the method of Descartes, which furnished occasion for the origin of an

c. IATRO-MATHEMATICAL (IATRO-MECHANICAL, IATRO-PHYSICAL) SCHOOL.

This "School", in contrast with the foregoing, in its physiology devoted its chief consideration to the solid parts (Solidism), whose form and functions it strove to discover and to demonstrate in the method to-day called "exact", i. e. by weighing, measuring, calculation, physical apparatus etc. Thus digestion e. g. was referred to a mechanical trituration (Erasistratus!), and the absorption of the chyle was explained as due to the pressure arising from the action of the intestinal movements upon the comminuted food. In a similar way the secretions were referred to the resistance created by the corners, curves, angles etc. of the vascular system, and to the difference or agreement of the specific weight of the secreting parts and the secreted materials. Respiration was based upon the mechanics of the motions of the thorax, warmth upon friction of the blood-corpuscles, sensation upon vibrations of the nerves, the action of the heart upon the mechanism of the pump, the circulation upon the laws of motion of fluids in tubes, locomotion upon the action of levers etc. Health accordingly consists in the undisturbed performance of the physical and mechanical processes in the body.

In pathology these same explanations, only inversely applied, were called in aid. The ingesta and excreta were compared, in order to determine the existence of disease, and recourse was had to pointed and angular crystals and corpuscles in the blood, and to the possibility or impossibility of the passage of these through the pores, as well as to a kind of mechanical acridity and stagnation (stasis) etc. Still dynamic and chemical explanations were not entirely and absolutely excluded.

In therapeutics the Iatro-physicists (like all halfway prudent physicians of every school) managed in accordance with the principles of genuine (Hippocratic) experience, and at least kept themselves free from one-sidedness — which cannot be said, or rather cannot always be said, of their polished successors of the present day.

ITALIANS. — The first representative of this tendency, though not the founder of the "School" based thereupon, was

SANTORIO SANTORO (Sanctorius Sanctorius, 1561–1635) of Capo d'Istria, professor at Padua and subsequently a practitioner in Venice, who enjoyed a high reputation among his contemporaries and among the greatest physicians of after ages — a reputation justly merited, were it merely for his persevering investigations! In respect to the insensible transpiration (perspiration) he accomplished, without any preparatory work, almost the same that Harvey did for the circulation. He thus deserves great credit in connexion with the doctrine of the conversion of material. In persevering zeal too he was not behind the Englishman! Only he did not point out in detail the exact method by which he arrived at his results, and he overlooked several precautions, so that although the "first precisian", he was blamed by later precisians. Like our physicians of the present day, he also taught how to investigate the pulse by means of an instrument of his own contrivance, and how to study, by means of a kind of thermometer[1], the temperature of the healthy and the sick. He also constructed apparatus for the bathing of bed-ridden invalids etc. Sanctorius, however, built up no system of therapeutics upon a single symptom; otherwise we might claim that he occupied the very latest stand-point!

The "Ars de statica medicina" of Sanctorius appeared in 1614. He continued his investigations with the balance for thirty years, studying the temperature, season and time of day, health and sickness, diet etc., but of the excreta only the urine and fæces. He found that in twenty-four hours the insensible transpiration amounted to 1¼ kilogrammes, a result which, when compared with those of the present day determined by far more complete apparatus, is only about ¼ kilogramme too high — a proof how accurately Sanctorius must have gone to work. — The important rôle of the perspiration, which he pointed out, was made use of by the Iatro-chemists to vindicate their exaggerated sweat-cures.

In pathology Sanctorius embraced humoral views.

The proper founder, however, of the Iatro-mathematical school was **Giovanni Alfonso Borelli** (1608–1679) of Naples. At first a teacher of mathematics in Messina, he accepted in 1656 a call to Pisa, and afterwards to a similar position at Florence, where he became a fellow of the Academia del Cimento. His quarrelsome disposition, however, led him to return once more to Messina. Here too he was unable to remain, and accordingly he betook himself to Rome, where Christina of Sweden (1626–1689), the daughter of Gustavus Adolphus, who had surrounded herself in Rome with a circle of savants and artists and had become a convert to Catholicism, supported him. She herself, however, soon fell into straitened circumstances, and Borelli, entering a monastery, supported himself by giving private instruction in mathematics, or, according to others, by begging in the streets of Rome. He had written for Christina his work entitled "De motu animalium", which was not printed until after his death.[2]

Borelli's chief services relate to physiology, in which (like Descartes) he followed purely mathematical principles. These services were especially great as regards the subject of muscular motion, which he supposed to take place through the effervescence of the nervous fluid with the blood. The action of the muscles, however, he explained by the laws of the lever, and considered both the amount of force employed and the loss of power resulting from unfavorable mechanical action etc. He incorrectly calculated the mechanical work of the heart at 1500 kil. per minute, in which he included the sixty-fold resistance of the small arteries, so that this work would have amounted in an hour to 90,000 kil., and in a day to 1500 million kil. He also explained the return of the blood to the heart, not by the *vis a tergo*, but by the aid of capillarity. The capillaries proper, however, he did not yet know. Secretion and the nutrition of organs he referred to the blood-pressure and to the diameter of the vessels, calling to his aid even the fluids in the nerve-tubes. Digestion is, in like manner, a purely mechanical process. Inspiration he correctly ascribed to muscular action, expiration to simple relaxation, while the lungs themselves are passive and even after expiration contain air. Sensation and motion are brought about by the nervous fluid flowing from and to the brain.

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[1] This was his own invention. Drebbel is regarded as the inventor of the air thermometer, and Galilei of the spirit thermometer. (B.)

The use of mercury in thermometers is said to have been suggested by Ole Römer (1644–1710). (H.)

[2] It was published by his friend P. Carlo Giovanni da Gesu at Rome in 1680. (H.)

In pathology Borelli was an opponent of Iatro-chemistry, on the ground that it was demonstrable neither by common experience nor by experiment, and he denies as well any evidence that fever e. g. originates in excessive action of the heart-muscle, due to irritation of the latter by an acrid nervous-fluid. There is no such thing as corruption of the blood, and, even if there were, a stoppage of the organs of secretion is rather to be assumed. The periodicity of fever is also to be explained by the defect last mentioned. — In his therapeutics Borelli considers purgation and bleeding ineffective in removing the acidity of the nervous fluid, but he expects that strengthening the organs by means of cinchona and favoring the invisible perspiration will be the more effectual in fever. He alone too remains true to the mechanical theory in therapeutics, while his pupil

LORENZO BELLINI (1643–1704) of Florence,

who, at the early age of nineteen, became a professor in Pisa and subsequently occupied a similar position in his native city, in his doctrine of secretion, assumes a "ferment" in the glands as an active agent. — In accordance with his mathematical doctrine of the enormous increase of resistance in the finest vascular plexuses, he referred fever and inflammation to a retarded motion of the blood, occasioned by its thickening and by the friction of the blood-corpuscles, a theory held also by the Bolognese professor Giac. de Sandris. — Upon the view above mentioned Bellini also based the therapeutic doctrines of derivation and revulsion.

As in our present cultivation of medicine (which manifests many points of similarity with that of the Iatro-physicians), practice i. e. therapeutics is, or rather was justly, obliged to strike out an entirely distinct road, so the Iatro-mechanics were constrained, in logical consistency, to admit a distinction between theory and practice. This distinction was first definitely emphasized by

GIORGIO BAGLIVI (1668–1707),

a pupil of Malpighi, professor at Rome, and a man of as universal education as he was intellectually gifted. In nosology he endeavored to divide diseases into those of the blood and those of the vital spirits, and with this idea he combined the Malpighi-Pacchionian doctrines with his own views. In therapeutics he was a follower of Hippocrates, though in theory he embraced the mechanical principles so fully that he compared the lungs to a pair of bellows, the heart and vessels to waterworks and their pipes, the teeth to scissors and the stomach to a flask. (The latter comparison is still substantially true at the present day in very many instances in Germany and elsewhere!). Baglivi is the author of the often quoted maxims: "He who diagnosticates well cures well", and "Reasonable thought and observation are the chief roots of medicine; observation, however, is the thread by which the conclusions of the physician must be guided." Moreover: "Very frequently the result does not correspond to the expectations of the physicians, although these were founded, indeed, upon reason and experience. And this, not in consequence of the defective constitution of the rules of our excellent art, but because of numerous unexpected encounters with both external and internal conditions, or the carelessness and faults of the patient, the surroundings and the physician in prescribing and deciding those things required for the cure." "To deify and unduly extol the Moderns is becoming to no reasonable man. Medicine is not a production of human reason, but a daughter of time, originating in long experience." "The mania for forming new words checks the beginner in his successful advances." "The simple polish of academies or the visiting of libraries, wealth in books which continue unread, to shine in all the journals, all these do not contribute the least to the comfort of the sick." Similar principles in both theory and practice were advocated by

Giuseppe Donzellini of Venice.

Domenico Guglielmini (1655–1710) of Bologna,

professor at Padua, assumes a regular and irregular "fermentation of æthereal and saline particles" — the latter the cause of fever — and also adduces the laws of hydraulics and the diameter of the mouths of the vessels, in order to explain the processes which take place in the sound and the diseased body. He was half an Iatro-chemist and half an Iatro-mechanic.

Giamb. Scaramucci (mechanical medicine; the motion of the blood etc.)

was placed upon the Index, from which the Iatro-mechanics were frequently called upon to defend themselves.

Similar compounds of Iatro-chemical and Iatro-mechanical principles were represented by

Nicolo Crescenzo (about 1711);

Ferd. Santanielli (Lucubrationes physico-mechanicæ, Venice 1698);

Matteo Grandi (Treatise on man, the soul and the body, 1713);

G. Póleni (Letters to Grandi, 1724);

Ascanio Maria Bazzicaluve (about 1700) of Lucca,

who correctly regarded the blood-corpuscles as cells, out of which during their motion he supposed æther accompanied with animal heat to be disengaged; the famous Iatro-mathematician

Pietro Antonio Michelotti (about 1740) of Venice;

Giov. Battista Mazini (also Mazzino, about 1723) of Brescia,

professor in Padua, who assigned to the glands a systole and diastole, and considered the dura mater the source of motion and sensation, while he referred the activity of medicines to the form of their component atoms.

Paolo Valcarenghi (died 1780) of Cremona;

Antonio Fracassini (1709–1777) of Verona,

both of whom, like the two preceding physicians, belonged to the eighteenth century, and others. All of these physicians furnish evidence that even at this period, and under the infallible banner of mathematics, physics and chemistry, one might become mired within the field of medical science in bottomless hypotheses, whose possibility is conceivable in an historical point of view alone, but which also demonstrate that later ages, by special routes and under their own forms, do not always struggle after a better knowledge of the being, the development and the functions of man, and that each age, instead of the complete truth which it seeks, for the most part merely exchanges new errors, or new forms for old ones.

Among the French, as well as in Germany and Holland, the Iatro-mathematic system did not gain any considerable number of followers until the eighteenth century.

As early as the seventeenth century, however, Pierre Chirac (1650–1732) made a will in favor of a chair for this system in Montpellier, and Philippe Hecquet (1661–1737) of Abbeville in Picardy, subsequently a Carmelite monk, was an equally violent opponent of male midwifery, the inoculation of small-pox, bleeding from the foot, wine and meat — for the last thirty years of his life he abstained absolutely from the two latter — and of Iatro-chemistry, and a zealous defender of the mechanical theory of digestion. On the other hand the famous architect and anatomist, Claude Perrault of Paris (1613–1688, died of blood-poisoning, the result of a wound received in the dessection of a putrid camel, a rarity in those days) and

Denys Dodart (1634–1707, also of Paris and a member of the Académie), who for 28 years had proved the experiments of Sanctorius, explained the theory of the voice especially on Iatro-mechanical principles. — Anticipating somewhat we bring forward from the eighteenth century the following physicians, who were Iatro-mathematicians either wholly or in part: J. B. Silva (1682–1742) of Bordeaux, professor in Paris; Antoine Ferrein (1693–1769), of Frespech near Agen, professor of surgery and anatomy at Paris (the pyramids of Ferrein); François Quesnay (1694–1774), the first permanent secretary of the Academy of Surgery in Paris; Hugo Gourraigne (about 1730), of the Faculty of Montpellier; finally François Boissier de la Croix de Sauvages, the follower of Stahl and a dynamic physician (in which capacity we shall consider him hereafter), and his pupil J. Ant. Butini.

Next to Italy, the Iatro-mathematical system, rather singularly, won the greatest number of votaries in England. In fact the latter country very considerably surpassed the former in Iatro-mathematical fanaticism.

William Cole of Bristol (about 1675)

was in part a follower of Sylvius (or Willis). He considered tension of the nervous system, due to a deposit of abnormal material upon the nerve roots, the usual cause of fever, and especially of the symptoms of irritation occurring in fever, and regarded differences in this material as the cause of modifications of the disease. He also taught the constant expansion of the arterial system towards the capillaries. The world-famed

Archibald Pitcairn (1652–1713),

who was been already mentioned, was likewise a great Iatro-mathematician.

William Cockburn (about 1696)

too embraced Iatro-physics eclectically. He was the author of a treatise on syphilis[1]

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[1] Cockburn's treatise was entitled "The symptoms, nature, causes and cure of a gonorrhœa". He also wrote "On the nature, causes, symptoms and cure of the distempers that are incident to seafaring people", London. 1696. (H.)

(1713), in which he first located the seat of gonorrhœa in the mucous glands of the urethra, though, according to Proksch, this was done in 1709 by Laurentius Terraneus of Turin, Dr. med. et phil. Heretofore the disease had been regarded as a discharge of corrupt semen.

Enthusiasm in calculation, however, really began with

JAMES KEILL (1673–1719),

a physician of Northampton, who in his explanation of secretion assumed two kinds of attraction, and, in accordance with the laws of higher mathematics, computed the velocity of the blood-current at 156 feet per minute (too low a rate), the force of the heart at five ounces (now one kil. to a half metre of height),[1] and the quantity of blood expelled from the heart at each pulsation at two ounces (now six ounces), while

JAMES JURIN (1684–1750),

secretary of the Royal Society at London, found the heart's force to equal three pounds raised one inch high in a second. (Keill had busied himself for eight years in repeating the experiments of Sanctorius, and had found approximately the same values, but had also proven the untenability of the assumption that suppression of perspiration was a general cause of disease.)

ALEXANDER THOMPSON (about 1700),

in order to aid the heart, claimed that the arteries also assisted in the propulsion of the blood. — The famous

GEORGE CHEYNE (1671–1743)

declared the lowering of the elasticity of the "fibres" to be a general cause of disease but deduced ordinary fever from a stoppage of the glands (which played a great rôle in the medicine of that day), and lingering fever from atony of those organs. He also wrote on the diseases of the sea (scurvy) and employed the thermometer. (It may be stated as a matter of curiosity that he lived for sixteen years upon bread and milk alone).

JEREMIAH WAINWRIGHT (about 1700)

referred the viscidity of the secretions to the winding course of the arteries, and their liquidity, on the contrary, to the direct and more rapid current of the blood. In this opinion

HENRY PEMBERTON (1694–1771)

substantially agreed.

BRYAN (1732) and NICHOLAS ROBINSON (1725),

following Newton, who exercised great influence in general upon this phase of English medicine, assumed an animal æther in place of the nervous fluid, and the latter physician referred sensation to vibrations of the tense fibres, and nervous diseases to excessive tension of these fibres.

Iatro-mathematical text-books were supplied by Peter Shaw (died 1763; editor of the writings of Robert Boyle) and Charles Perry (1741).

George Martine (1702–1743) of St. Andrews, Scotland, affirmed that in men greater friction between the blood-corpuscles occurred than was the case in women, for which reason the male sex possessed greater warmth of constitution than the female (the reverse is rather more correct). Other Iatro-mathematicians of the eighteenth century, who (like some of those already mentioned) also accepted the doctrines of Stahl, were: John Tabor, William Porterfield, Frank Nicholls, Thomas Morgan, and the noble Richard Mead (1673–1754) of London, who greatly contributed to the support of this system. — Edward Barry thought that the age of a man could be calculated Iatro-mathematically from the frequency of the pulse, due regard being paid to the diet and other sources of error, while Clifton Wintringham, Jr. (1710-1794) — his father bore the same name — thought he could determine the subsequent physical conditions of a man from the spermatozoa employed by his father in his construction, and that he could compute definitely the weight of an individual spermatozoon, thus entering a department which the Iatro-mathematicians very wisely almost all avoided.

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[1] Or half a kilogrammetre = about 3.60 foot-pounds English. The kilogrammetre or French unit of work is the work performed in raising one kilogramme (2.2 lb) through one metre (3.28 feet). It is equal to 7.233 English foot-pounds. (H.)

In Germany, among the Iatro-mathematicians, who here too were friendly to the principles of Stahl, are reckoned:

GEORG ERHARDT HAMBERGER (1697–1755), a genuine German professor of the day in Jena, disputations, yet at last devoted to the honor of the truth, who carried on a long quarrel with Haller, but is said on his death-bed to have finally declared himself conquered; Joh. Friedr. Schreiber (1705–1760) of Königsberg, both more famous than Joh. Gottfr. Brendel (1711–1758) of Göttingen (surnamed the "Genius ohne Posaune", and possessed of so retentive a memory that he knew the Æneid by heart both forwards and backwards), and Joh. Gottlieb. Krüger (1715–1759) at Halle and Helmstädt; the two Bernoulli in Basel and Ernst Jeremias Neifeld (died 1772).

Finally such devotion to the physico-mathematical theory was developed, that even centrifugal machines for the treatment of the sick were proposed. The thermometer was only occasionally employed. The air-pump, however, invented at this period by Otto von Guerike[1] (1602–1688) of Magdeburg, like the ordinary bellows somewhat altered (with a manometer similar to that of the steam engine), was left to posterity as a field for physico-therapeutic triumphs in the multiform and much abused department of treatment, and Nathaniel Henshaw[2] accordingly at that time (1664) was only able to make a beginning with pneumatic apparatus. He constructed a "Domicilium" (revived in our day as the pneumatic cabinet), in which he had patients suffering from acute diseases inspire condensed air for several hours a day, while chronic cases were allowed to breathe rarified air.

Since, from methods of research and investigation correct and excellent in themselves, a kind of one-sided and ready-made "system" was at first rashly upreared, without waiting for the final results to be attained therefrom before incorporating them in the foundations of the superstructure; this precipitancy and imperfection, even though it had been possible to adorn the edifice externally with some reliable facts, were compelled to revenge themselves by the downfall of the Iatro-mathematical structure, which had benn pushed continually higher and higher upon foundations internally defective. The Iatro-mathematical "system", though not entirely unprofitable to science, yet proved itself unfruitful in the advancement of medical practice, that is to say the practical aims of medicine. The latter were finally compelled to be worked out by the way, which, since the days of Hippocrates, has been found the only reliable one — the way of experience and observation — and this was accomplished in the "Land of Common-Sense", at a time when within its borders Iatro-chemistry and Iatro-mathematics were still in the perfection of their bloom, or, as was believed at that time, were most completely established. Such was the work of the great practitioner

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[1] He was the first to exhibit the electric spark and invented the first electric machine.

[2] "Aërochalinos, or a register for the air", London, 1677. (H.)

5. SYDENHAM,

that cool, clear and unprejudiced spirit, free, so far as this was possible, from the influences of his time, who in the golden age of systems declined "to be like the man who builds the chambers of the upper story of his house before he has laid securely the foundation walls, for that is rather building castles in the air than investigating nature," and who sought most justly the true value of medicine and its recompense in the benefit which it brings to the sick in their cure, without, however, scorning or entirely neglecting its scientific side.

THOMAS SYDENHAM (1624–1689) of Winford Eagle in Dorsetshire, the son of a thriving farmer, entered the university of Oxford at the age of eighteen. His studies here, however, were interrupted, and it was not until 1648, after a prolonged absence in camp[1] and in London necessitated by the civil war, that he was able to resume his labors as a student of medicine. On the completion of his studies at Oxford, Sydenham is said to have gone to Montpellier, and his sojourn here must have been as influential upon his practical bent as was the residence of Harvey at Padua upon his disposition to investigation. Sydenham took his degree of Doctor in Cambridge, and then settled in Westminster, London. In 1663 he became a member of the College of Physicians of London. He was always a reluctant author, and his writings were fairly wrung from him by his friends. Sydenham died of gout, a disease from which he had suffered since his 30th year, and was buried in Westminster Abbey, where in 1810 a monument was erected to his memory by the College of Physicians. With respect to the other circumstances[2] of Sydenham's life we know nothing more than that he fled from London during the prevalence of the plague (an action which must not be condemned too severely, since it was the usual custom at that day), and that he had children—among them a son William, who was also a physician. He was a very busy, successful and distinguished practitioner, who fulfilled his duties to nature and to his patients as simply and completely as he did his obligations to science by his scientific principles based upon "Nature as the complex of natural causes".[1]

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[1] He was a soldier on the side of Parliament in 1642, while his elder contemporary Harvey, as physician of the king, was, so to speak, his antagonist, and finally attained the rank of captain.

[2] It is really remarkable how little knowledge we have of the details of the life of so eminent a physican as Sydenham. Born at Winford Eagle in 1624 he entered Magdalen College, Oxford, in 1642, but was soon forced to abandon his studies, and is said to have received a commission as captain in the Parliamentary army. If so, he must soon have resigned his commission, for he resumed his studies at Oxford in 1645 and rec̈eived his degree of Baccalaureus in Medicina, April 14, 1648. In the same year he received the appointment of Fellow in All Souls' College. For the next fifteen years we know nothing of Sydenham's life except that

Sydenham's model was Hippocrates, upon whom he seems to have formed himself almost exclusively, and whose principles, with some modifications resulting from the condition of knowledge in his day — on the whole only a few — he made his own. In pathology he was, like Hippocrates, a Humorist without being a theorist, and he defended himself against those who laid this to his reproach in almost the same words used by Hippocrates. Like the latter too (Sydenham was called the "English Hippocrates") he knew only one standard—observation and experience[2] — though he was somewhat skeptical as to the certainty of their results, and like him he recognized nature, or the healing power of nature,[3] as the sole, ultimate, undefined and undefinable, but (fortunately for physicians) existing and powerful assistant.

In accordance with his disposition to practical objects, Sydenham laid little weight upon anatomy and physiology, a feeling which he shared with almost all great practitioners. Yet he recognized their value when not employed in the production of hypotheses based upon pure theory. The latter he rejected, though he admitted hypotheses borrowed from practice for the sake of elucidating disease, and especially for the determination of curative indications, or of a definite therapeutics (hypotheses

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he spent some time in Montpellier pursuing his medical studies. But June 25, 1663, he was admitted a member of the Royal College of Physicians of London, preparatory to settling permanently in that city. It was not, however, until 1676 that he took his degree of M. D. in the university of Cambridge. His chief work, entitled "Observationes Medicæ", is said to have been written originally in English, and to have been translated into Latin by Dr. John Mapletoft, after which the original sheets were destroyed. It appeared first in the year 1666. Sydenham died in London Dec. 29, 1689. (H.)

[1] "Ego enim, quoties naturam nomino, toties causarum naturalium complexum quendam significari volo."

[2] How very averse Sydenham was to all mere book-study in medicine, may be inferred from the story that in reply to Dr. Richard Blackmore, who inquired for a good guide in practice, he sarcastically recommended "Don Quixote". This work is certainly adapted to lead one to the keenest observation, particularly of all the foibles and phantasies of mankind, and the advice of Sydenham was probably designed to indicate the special applicability of such observation in medicine. [I suspect Sydenham merely intended to suggest that to a physician who proposed to guide his practice by books alone Don Quixote would be as good as any other. (H.)] On another occasion he declared that the arrival of a good clown exercised a more beneficial influence upon the health of a city than that of 20 asses laden with drugs.

[3] What the Ancients call "Physis" or "Natura" has much in common with what we would name God.

based upon practice). To aid in the discovery of the latter, and for the determination of the long neglected "species of disease", he demanded extremely careful observation and description (for which he himself, like almost all great practitioners, e. g. Hippocrates, Celsus, Aretæus etc., possessed an artistic aptitude), for he recognizes as the supreme and first need of practice a definite and certain method of treatment, based upon species botanically limited (if such an expression is permissible). In description, however, the common every-day cases with which the practitioner has mainly to deal, and the typical points of their course, should be chiefly regarded, not the exceptional cases (which improperly play the chief rôle in our clinical instruction of the present day).

Sydenham's conception of disease is something active, operative, indeed something like an actual practitioner, the best of all physicians (the internal physician of Paracelsus), for he regards it as a natural effort of the body to remove morbid material from the blood. If its action is violent and quickly ended, we have to do with an acute disease, but if it progresses slowly and with difficulty, the conditions are chronic. Fever, in particular, is the most important process of purification, designed to remove the morbid material of the blood, and in his view is substantially an "inflammation of the blood", which can be recognized by the crusta phlogistica. It originates chiefly from cold or from epidemic influences.

The causes of disease are unknown influences and changes (not meteorological) of the atmosphere, which flow from the "bowels of the earth" with a certain regularity and periodicity — this holds good especially for epidemic and acute diseases — or they are defects of the humors resulting from an improper mode of life. The latter is to be particularly considered in chronic conditions.— From the same causes however, very different individuals and phenomena of one and the same species of disease may arise.

Besides the constitution of the season — he considers e. g. the beginning and the end of winter each year to dispose to pneumonia — Sydenham gave especial prominence to the epidemic constitution, under the influence of which, according to his observations, all other diseases occurring during any occasional epidemic assume a special character. Hence he claims a "stationary fever"[1] as a kind of common fundamental process, an *ens morbi*. From 1661 to 1675 Sydenham observed five such "constitutiones" in the epidemics which he describes. During the great epidemic of plague in London, however, he did not remain at his post.

In Sydenham's special pathology the "inflammation of the blood", already mentioned, plays the chief rôle, and upon it depend pretty nearly all acute diseases and even many chronic conditions. A few only were ascribed to altered (nerve-) spirits, "spiritus" (like hysteria), to weakness of digestion (like gout), or to weakness of the blood (as dropsy) etc.

Therapeutics. — Sydenham arrived at *the healing power of "nature"*, for which he made such great claims and upon which he laid such stress, by his careful observation of epidemics. This power, however, he, like almost all physicians before and since (Hippocrates not excepted), so understood, that there always remained a good deal for the physician to do, and very often quite active interference was required. Thus in syphilis he gave mercury until two kilogrammes of saliva were discharged daily. This interference might pass subjectively for "support or improvement of the efforts of nature", though very often, as the result, the health was ruined. Sydenham's therapeutics manifestly, therefore, can claim the merit of simplicity only when compared with the great abuses of preceding ages! And yet he employs e. g. eighteen different herbs in one prescription, and that merely an ointment for inunction! On the other hand, he lays down the precept that a regular and salutary system of management cures many diseases frequently better than the powders of the apothecary-shop. The same old story, which remains always new, that even a physician of the best principles becomes, and must become, unfaithful to his principles in practice, or else fall a victim to the prejudices of the public and — his colleagues!

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[1] Febres stationariæ.

Sydenham regards not only the constitution of the individual, but also that of diseases or epidemics, as well as the season, the cause of the disease etc. He is likewise a great advocate of the antiphlogistic method in almost all diseases, and employs with this object diet, cathartics etc., and above all bleeding, which he practised with special frequency. Besides these he values very highly the corroborant method. Still he believes both these methods specially efficacious as therapeutic methods in acute diseases only, and that in these their reliability is confirmed by experience, while for chronic diseases such is not the case. The unreliability of the action of drugs induced Sydenham to hope for, and to rely upon, specifica (like Paracelsus), but of these he recognized only one single article, the then newly discovered cinchona, and in opposition to all theoretical principles as well as to all those derived from Antiquity, he entered the lists in defence of this drug with all his power. Even the effects of mercury in syphilis he ascribed solely to its favoring the evacuations. Among drugs, he employed especially those from the vegetable kingdom (jalap, resins, asafœtida etc.), and particularly cinchona and opium in the form of the so-called laudanum liquidum Sydenhamii, which had been already brought forward, however, by Theophrastus von Hohenheim. The latter drug he considered the noblest, and almost the only, "Cardiacum" (he was very fond of the so-called cardiaca). Of mineral remedies he employed calomel, iron, salts etc.

The great importance of Sydenham, so far as his own age is concerned, depends after all upon the struggle for the healing power of nature and for simple observation and treatment, which he, as a matter of fact, rather inaugurated than fought energetically to a conclusion against the overgrown luxuriance of systems and theories. For the future, however, he became the chosen standard-bearer of progress in practical medicine, that is of that return (so often recurring in the history of medicine) to the Hippocratic method and art of healing, which are founded in the nature of things and in the limits of human ability, and are therefore imperishable.

An opponent of Sydenham was RICHARD MORTON (1635–1698), also a practitioner in London, who likewise (like so many before and after him) professed to follow nature, when he really followed his own ideas and highly extolled the heating system of therapeutics. By this system too he cured the sick with as great success as did Sydenham with his cooling system, and thus either the power of nature or the powerlessness of all therapeutic methods (but by no means any error of his opponent, as Morton believed) was demonstrated. Like Fernel, Morton considered all diseases a kind of poisoning of the "vital spirits". He also gave a very famous description of small-pox, measles, scarlet fever, masked intermittents and phthisis.

GIDEON HARVEY (died about 1700) occupies an entirely isolated position among the physicians of the seventeenth century, like a kind of Magnus of Alexandria of his day. [He was ordinary physician to king Charles II., medical director of the army in Flanders in the year 1659, then physician to William III. (1650–1702) and city physician of London.] He embraced the expectant method (he wrote "The art of curing diseases by expectation" 1689), and was a scourge to the physicians of his day, whom he "designated dung-doctors, who drive out diseases through the anus",[1] because most of them in febrile diseases gave a cathartic every second day and began treatment with an emetic. Besides this he published satirical writings against physicians ("The Conclave of Physicians: detecting their intrigues, frauds and plots against their patients.")—and it has therefore been his fate to be omitted in the compendia. On the other hand,

Sir THOMAS BROWNE (1605–1682) of London

enjoyed, and still enjoys, great reputation as author of the work entitled "Religio Medici", though he was so superstitious that in 1664 he swore that two condemned old women were actual witches.[2]

η. THE ADVANCEMENT OF PATHOLOGY BY INDIVIDUAL PHYSICIANS.

It was not so much within the schools, to which most physicians belonged, as without their directing influence (so far as this was possible for those who lived in a decided epoch of schools), that pathology in the seventeenth century experienced its chief enrichment and attained a secure foundation. Under the head of enrichment we may include the rise of the so-called geographical diseases and of the pathology of the trades, with the description of new, or newly observed, diseases. On the other hand the confirmation of diagnosis in the living by investigation of the pathological anatomy after death may be reckoned the foundation of pathological science.

The seventeenth century exhibited in medicine a great similarity in all respects to our own. This is shown in the numberless "Observationes" and "Casus" published during this period, which, however, appeared in "Decades" and "Centuriæ" only, not in some few examples.

The corner-stone of geographical and comparative pathology was laid by the travels of the physicians of this period, as well as by the more careful observation of epidemic diseases in particular, in which this century of wars was so rich.

In the subject of geographical pathology the following physicians are of chief importance: Jac. Bontius (Beriberi, died in Batavia, 1631), professor in Leyden, and Wilhelm Piso[3] (Lepois, 1611–1678), the former for the East Indies, the latter for Brazil; Engelbrecht Kämpfer (1651–1716) of Lemgo, the famous traveller in Central Asia, who was also twice in Japan as ship-surgeon, and whose writings until very recently formed the treasury of all our knowledge concerning the latter country and the neighboring islands; Andreas Cleyer (diseases of the East Indies and China) of Cassel about 1675, a ship-surgeon in the Dutch Indies; Willem G. ten Rhyne of Deventer (for the same countries); William Cockburn (The diseases of seafaring people, 1696).

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[1] He divides the physicians of his day into six classes: ferrea, asinaria, jesuitica, aquaria, laniaria and stercoraria, according as their favorite systems of treatment were the administration of iron, asses' milk, cinchona, mineral waters, venesection or purgatives. (H.)

[2] Browne's "Enquiries into Vulgar and Common Errors", which appeared in 1646, does not seem to have preserved its author from the commonest error of his age. (H.)

[3] Two other physicians named Piso also lived in this century: Homobonus Piso, an opponent of Harvey, and Charles Piso (1563–1633), who published some "Observationes". A Nicolas Piso, who was ordinary physician of Lorraine, died in the year 1590.

The following physicians, in addition to many others, made themselves prominent in medicine by "Observationes", which, in contrast to the so-called "Consilia", announced by their very title that their authors occupied the newest stand-point of that day: Isbrand van Diemerbroeck (1609–1674), professor in Utrecht; Vincenzio Baronio, a physician of Forli (Pleuropneumonia, 1633); Zacutus Lusitanus (Abraham Zacuto, 1575–1642), "Observationes"; J. P. Lotichius (1598–1669), petechial typhus in Hesse, the bubo plague etc.; Lazar. Rivière (1589–1655; the "Potio Riverii" is still in common use), "Observationes"; Herman van der Heyden (1572–1655), dysentery; the Dane, Joh. Rhodius (1587-1659), "Observationes"; Nic. Chesneau (born 1601), an opponent of Schneider; Benedictus Sylvaticus (died 1658), "Consilia"; Fred. van der Mye (about 1627), petechial typhus; Arnold de Boot (1606–1650), "Observationes"; Thomas Willis, who in 1674 determined the sweetness of diabetic urine by the taste; Pierre Borel de Castres (1620–1689), "Observationes"; Isaac Cattier, a physician of Montpellier, "Observationes"; J. Morel (about 1628), petechial typhus: Valerius Martinius in Venice, "Totius medicinæ practicæ exactissima collectio"; Phil. Salmuth (died 1662), "Observationum medicarum centuriæ tres"; J. C. Claudini (died 1618), "Observationes": Guillaume Loyseau, "Observationes medicinales et chirurgicales"; Joh. Jac. Manget, Prussian physician-in-ordinary, "Observationes chirurgicales"; Thom. Bartholin and Wolfgang Gabelshofer (born 1539) "Centuriæ"; J. Stephanus "Consilia"; Malachias Geiger, Medico-chirurg. observationes; J. Dan. Horst (1620–1685) of Giessen, ordinary physician in Darmstadt, a correspondent of Harvey's; Wolfgang Höfer (1614-1681), cretinism; Raimund Torti (1603–1678), "Consultationes, Responsa et Consilia"; Gerhard Blasius (died 1692), "Observationes medicæ rariores"; Fried. Lossius, diseases of the nervous system; Bernh. Verzascha (born 1628), "Observationes", including the vagitus uterinus; Balth. Timaeus von Güldenklee (1609–1667), ordinary physician of the Great Elector, "Casus medicinales"; Corn. Stalpaart van der Wiel, "Centuriæ"; Joh. Nic. Pechlin (1646–1706), "Observationes"; Ido Wolf (1615–1693) and his son Johann Christian; Martin Lister (died 1711); G. A. Mercklin (1644–1702); the elder Mercklin, of the same Christian name (also settled in Nuremberg, where this medical family still survives), lived 1613–1684; C. Van de Voorde (1650–1720) of Amsterdam (on noma); Pieter A. Verduyn of Amsterdam (flap incision in amputation); J. Vergniol and Van Wlooteon the same subject; R. Lowdham of Oxford, the first (1679) to make this incision,[1] and with the hope of securing healing by first intention; he also wrote upon this plan of management; Giov. Battista Cortesi (1554–1636), on surgical operations.

Bernardino Ramazzini (1633–1714), professor in Padua, was especially eminent and famous, and is important as an epidemiographer, and the first student of the so-called trade-diseases, on which subject he wrote his "De morbis artificum diatriba" (1700).

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1. Even as late as the 17th century the practice of amputation was limited almost exclusively to removal of the fingers and toes, the hand, foot, forearm and leg. Amputations above the knee, and still more above the elbow, were regarded as extremely venturesome undertakings. The flap-operation is first mentioned in a letter of the English surgeon James Yonge (Young), appended to his "Currus triumphalis e terebinthina", which appeared at London in 1679. He describes the operation as performed by Lowdham of Oxford. Sprengel ascribes the invention of the operation to Richard Wiseman, Sergeant-Surgeon of Charles II. and James II., but no mention of it appears in Wiseman's "Several surgical treatises", published at London in 1676 (Haeser). (H.)

The famous Jesuit Athanasius Kircher (1598–1680) of Fulda, who already brought forward the Darwinian maxim "Struggle and counter-struggle maintain the general life", and sought in the microscopic organisms of the air ("worms", seen with a microscope of low power in putrefying matters, e. g. the blood and pus of plague-patients etc.) the cause of infectious diseases, especially the plague. He also described hypnotism in certain animals; Joh. Christian Lange and Jean Bapt. Goiffon (1658-1730) of Lyons, accepted a similar pathologia animata. Nath. Hodges, who remained in London during the plague when Sydenham fled; Lucas Schacht (1634-1689), professor in Leyden (scurvy), and Johann Hellwig (1618–1674) of Nuremberg, must also be mentioned.

The following non-epidemic new diseases were described during the course of the seventeenth century: Rhachitis (the Latinized form of the then popular name "rickets") by Francis Glisson[1] (1650); the Guinea-worm (known already to the Ancients) by Georg Hieron. Welsch (1624-1677), a physician of Augsburg. The itch-mite was discovered in the pustules of itch by Giovanni Cosimo Bonomo[2] in 1687, on the statement of a washerwoman; yet he was not applauded as a discoverer, because nothing was seen anywhere but the popular "acridity".

The apothecary Diaciuto Cestoni of Livorno had a share in the discovery, and a certain Isaac Colonello made a sketch from the microscopic preparation in question which represented the mite in the process of laying eggs. The mite, i. e. the animal and its existence in the itch, was also known at an earlier period among the people. Jos. J. Scaliger (1540–1609) of Leyden described it (as well as the burrows) in 1557, though without knowing the causative relation of the mite to the eruption.

The Englishman Thomas Mouffet (died about 1600), who wrote a famous book[3] on insects (said by some to have been taken from Gesner's manuscript), was the first to give a plain description of this mite.

Observations based upon autopsies were published by Joh. Jac. Wepfer (1620-1695), archiater at Schaffhausen, physician-in-ordinary to the Duke of Würtemberg. (apoplexy); Gerhard Blaes of Amsterdam; Giov. Maria Lancisi (1655–1720) of Rome, a famous physician-in-ordinary to the pope (De subitaneis mortibus; De motu cordis et aneurysmatibus), who already employed percussion of the sternum, and distinguished himself as a hygienist; Seb. Pissino (De cordis palpitatione cognoscenda et curanda, 1609); Christopher Bennet (1617-1655) and Richard Morton

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[1] Glisson was anticipated by Daniel Whistler (died 1684), whose thesis for the Doctorate at Leyden in 1645 was entitled "De morbo puerili Anglorum, quem patrio sermone indigenæ vocant The Rickets". The Dutchman Arnold de Boot (1606–1653), who served in the English army in Ireland, also mentions the disease in his "Observationes medicæ de affectibus omissis", London, 1649. The "Flagellum Angliæ seu Tabes Anglica" of Theophilus de Garancieres, published in London, 1647, and usually mentioned as one of the earliest treatises upon rickets, according to Drs. S. Gee and John S. Billings, is devoted to an obscure form of consumption and not to the disease in question. Glisson's "Tractatus de Rachitide, seu morbo puerili Rikets dicto", London, 1650, was, however, the first work which excited much attention to the disease on the part of physicians. (H.)

[2] His work entitled "Osservazioni intorno a Pellicelli del corpo umano" appeared at Florence in 1687. It was translated into Latin by Joseph Lanzoni. (H.)

[3] The work referred to, entitled "Insectorum seu minimorum animalium Theatrum", was the continuation and conclusion of a work which had been undertaken by Conrad Gesner, Edward Wotton and Thomas Penn. It was published by Turquet de Mayerne in London, 1634, many years after the death of its author. (H.)

(both on phthisis pulmonum); R. Vieussens (Diseases of the heart); Willis (Diseases of the brain); and others, whom we shall learn to know when we come to discuss pathological anatomy proper.

b. Surgery (Ophthalmology, Otology, Dentistry).

In contrast to the systems and schools, which flourished so luxuriantly in the medicine of the seventeenth century, and to the often excessive partisanship and adulation of their disciples, it is pleasant to see surgery, on the whole, working up slowly into a scientific branch free from speculation, and the better surgeons, most of whom were distinguished for their modesty, striving more and more by study and observation, even in Germany, to acquire for themselves and their department a scientific position, to elevate it and place it upon a secure basis. The seventeenth century accordingly is undoubtedly highly important in the history of the development of surgery through this very elevation, attained in silence and accomplished within itself, although—and, indeed, as the result of the facts just stated—it could not enter into history distinguished by such brilliant advances and discoveries as marked the centuries preceding and following. Surgery too now won a wider field for action, since the Germanic peoples, the Dutch, English, Germans and Danes, who had up to this time attained little prominence, now began to distinguish themselves also in this department. Hence it is that the number of surgeons known by the writings which they have left us, or by their discoveries, is very large when compared with that of the sixteenth century. The increased scientific activity in the surgical department laid the foundation of the high position and estimation of surgery and surgeons which marked the 18th century.

Among the

α. ITALIANS,

who had, on the whole, already fallen from their former domination in medicine, we may mention

SANTORIO SANTORO,

who, as we know, distinguished himself by the invention of various instruments (a trocar for paracentesis abdominis, a speculum-like instrument, a kind of lithotrite, a self-injecting apparatus and a kind of shower-bath) and A. M. Valsalva, a good aurist and operator, who employed the ligature.

CESARE MAGATI (1579–1647) of Scandiano,

subsequently professor at Ferrara, was particularly prominent as a surgeon, and must be regarded as one of the pioneers of surgery, an art whose entire success depends upon the treatment of wounds. Plasters, balsams, poultices, salves, tents etc., with all their resulting uncleanness, were still the fashion, and against these abuses Magati now insisted upon simplification of the treatment of wounds and the infrequent change of dressings. Instead of changing the latter several times a day, as was the custom he would have them renewed but once in four days. These novelties forced him to defend himself against many of his contemporaries, and at last, when he had already joined the Franciscan order, compelled him to reply to Sennert. He died as the result of a lithotomy. His chief work was entitled "De rara medicatione vulnerum" (Venice, 1616). Of equal eminence was

Marco Aurelio Severino (1580–1656) of Tarsia in Calabria.

He was at first a lawyer, than a professor at Naples and, like many surgeons of this century, an important anatomist. He was fond of trepanning (an operation at this time very common) and operated upon hare-lip, epulis, empyema, performed bronchotomy, tied the crural artery high up for aneurism of the popliteal and recognized benign tumors of the breast. Yet, like the surgeon next mentioned, he was a special friend of the actual cautery, an offshoot of Græco-Arabian surgery not speedily uprooted, and which, as we know, still bloomed in our own century (Larrey, Rust etc.)

Pietro de Marchetti (1589–1673) of Padua,

a bold and versatile operator, was professor of surgery in his native city. We must mention also

Giuseppe Francisco Borri (1625 or 1627–1695 or 1704, Burrhus, Borro) of Milan,

the son of a physician and specially skilful as an oculist. He is, however, better known from his sad fate. In consequence of his liberal religious views he was driven into exile, and, having been delivered up by Germany on the requisition of the papal nuncio, wore away his life in Rome, first in the prisons of the Inquisition and then in the Castle of St. Angelo, where the poor fellow died after a prison-life of 25 years.

Giovanni Battista Cortesi (1554–1636),

professor of anatomy and surgery in Bologna and Messina (rhinoplasty); Adrian van Spieghel (Spigelius 1578–1625), who practised trepanning seven times upon a single patient; Jac. Zannaro, eminent in the rhinoplastic art;

Dion. Sancassini (1659–1738),

whose treatment of wounds followed the principles of Magati; Giuseppe Lanzoni (1663–1730) of Ferrara (gunshot-wounds, wounds of the head, arteriotomy); Tommaso Alghisi (1669–1713) of Florence; Carlo Musitano (1635–1714), professor at Naples, who, according to E. Albert, was already acquainted with the red color of the retina — Boll-Kühne's "Sehpurpur"; Paolo Manfredi (about 1668), professor at Rome, and a votary of transfusion and infusion, which operations were also practised at that time by Guglielmo Riva (1627–1677) of Asti in Piedmont, surgeon in Rome, and Carlo Fracassati. Bernardino Genga of Rome was also a surgeon of importance during the latter half of the seventeenth century. Among

5. THE FRENCH,

who, in the century of Richelieu, Mazarin, Louis XIV., Corneille, Racine, Molière, Fénelon, Lafontaine, la Bruyère, Boileau, Bossuet etc., laid securely the foundation of that leadership in surgery which they were to hold without a rival in the 18th century, while in the 17th they had rivals even in Germany, the surgeon Morel, by his invention of the tourniquet at the siege of Besançon in the year 1674, was a benefactor of the unfortunate victims of the knife. That Jean Baptiste Denis (died 1704), physician of Louis XIV., with the assistance of the surgeon Emmerez, performed the first transfusion in man, cannot be regarded as any permanent gain to surgery.

The transfusion of the blood of the young into the veins of the old, in order to rejuvenate the latter,[1] had for a long period been a *pium desiderium*, to which Marsilius Ficinus and Hieron. Cardanus, among others, had given expression. Andreas Libavius[1] by recommending the operation (1615), and Giov. Colle (died 1631), professor at Padua, by his description of a method (1628), had supplied new support. Richard Lower and Robert Boyle practised transfusion in dogs. The London Faculty sought the value of the operation in its preservation of life after excessive hæmorrhages. While the physicians mentioned above had conducted arterial blood into a vein, Edmund King, ordinary physician of Charles II., in the same year 1665 practised a transfusion from vein to vein. Denis was the first to carry out the same operation practically with lamb's blood upon a patient sinking under an excessive venesection — an operation very generally abused in the 17th century (even the Czar Peter I. had himself bled once a year). The patient became maniacal after the operation, urinated blood after its repetition, and finally died. Lower and King,[2] however, undertook the operation upon a healthy person, and met with success. Riva, on the contrary, transfused blood into a phthisical patient, who (like most patients who undergo direct transfusion in our own day) speedily died, while Paolo Manfredi finally had a successful result. Since most of the operations had turned out unfortunately or had been barren of results, the operation itself was first combated with the Bible (e. g. by Bart. Santinelli, a physician of Rome), and then forbidden by the Parliament of Paris, whose action was finally followed by the pope. In our own century transfusion has again appeared and disappeared — another evidence of the similar tendencies of the 17th and 19th centuries.

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[1] The most ancient art of rejuvenation — for the Ancients also made many efforts in this direction — was very different. Thus David in his extreme old age appropriated for rejuvenating purposes the most beautiful maiden in Israel, and

Of the French family of lithotomists, the Colots, Laurent and Philippe (1593–1656) his son, distinguished themselves in this century as capable and popular specialists. The last member of this family, François, died in

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Mohammed, after the death of the aged Kadijah, selected also two wives aged 7 and 8 years, to strengthen his failing powers. [Yet the ancient Medea seems to have adopted the modern plan — perhaps because she was a woman. (H.)]

[1] He seems to have written under the influence of Magnus Pegel (1604), a professor in Rostock. See Haeser. (H.)

[2] The active rivalry of the different nations in the study and practice of the operation of transfusion is shown by the fact that the first operation of Denis was performed June 15, 1667; Edmund King in England followed with a case Nov. 23, 1667; Riva's first case occurred in December of the same year and Purmann operated in 1668. The operation awakened some singular questions. Thus Boyle was curious to know whether it could change the temperament of the patient, whether the transfusion of lamb's blood into the veins of a dog would ultimately convert the dog into a sheep etc., while Sigismund Elsholz of Berlin proposed to reconcile all unhappy marriages by the reciprocal transfusion of the blood of the "incompatible" consorts! The gossiping Samuel Pepys records in his diary under date of Nov. 21, 1667: "With Creed to a Tavern, where Dean Wilkins and others: and good discourse: among the rest of a man that is a little frantic (that hath been a kind of Minister, Dr. Wilkins saying that he hath read for him in his church), that is poor and a debauched man, that the College have hired for 20s. to have some of the blood of a sheep let into his body: and it is to be done on Saturday next. They purpose to let in about twelve ounces; which they compute is what will be let in in a minute's time by a watch." On the 30th of the same month he writes: "I was pleased to see the person who had his blood taken out. He speaks well, and did this day give the Society a relation thereof in Latin, saying that he finds himself much better since, and as a new man; but he is cracked a little in his head, though he speaks very reasonably and very well. He had but 20s. for his suffering it, and is to have the same again tried upon him: he first sound man that ever had it tried on him in England, and but one that we hear of in France." (H.)

1706. This speciality of lithotomy must have found at that period, to all appearances, considerably more material than would be the case to day. The field of general surgery in France exhibited too at this epoch no small number of zealous laborers, though the most of them failed to make their names famous. Among these were François Thévenin (died 1656); Jean Vigier (1614–1658); J. de Marque (bandaging, 1618); Jean Bienaise (bistouri caché, 1601–1681); Jos. Covillard (properly Couillard; "Le chirurgien opérateur," Lyon, 1633); the family Verduc (Laurent Sr. died 1695, Laurent Jr. died 1703, J. Philippe, the elder brother of the last mentioned); François Tolet (Traité de la lithotomie, 1673); Jean de Launay (lithotomist and monk, born 1649); Goursaud, who survived until the 18th century and was the first to describe incarceratio stercoralis; Jean Jacques Manget (1652–1742); Jos. Guichard Duverney (growth and nutrition of the bones by the periosteum); Augustine (1653–1730) and Michel Antoine Belloste (inventor of the long famous liquor Bellostii); la Vauguyon (operations, 1696); J. de la Charrière (surgical operations, 1696); Daniel le Clerc (1652–1728) of Geneva; Jean Ant. Lambert (injections in hydrocele); Nicolas Andry of Lyons (1658–1742), professor at Paris, wrote on orthopædic surgery and originated the name "orthopédie": Pierre Dionis, a famous surgeon (died 1718), ordinary surgeon of the queen of France and of the empress Maria Theresa, who was the first to emphasize the effects of rickets upon the pelvis; Jacques Baulot (Beaulieu, 1651–1714), who from a day laborer and a soldier worked himself up to the position of a famous lithotomist, and was a surgeon of lasting importance. After joining the Franciscans he bore the name of Frère Jacques, and under this title passes for the inventor of lateral lithotomy. Barthélemy Saviard (1656–1702), maitre-chirurgien of the Hôtel-Dieu, who, among other things, determined the seat of strangulation to be in the neck of the hernial sack was also eminent as a lithotomist and herniotomist. George Mareschal (1658–1736), ordinary surgeon of Louis XIV. and one of the promoters of the foundation of the Académie de Chirurgie in the following century, was a rapid lithotomist — stories are told of 8 lithotomies in half an hour! — and a bold surgeon, and is also famous for his services in improving the schools of surgery in France.

In the seventeenth century ophthalmology in France was especially advanced and excellently cultivated, though even yet it was assigned to the despised surgeons. Among the French oculists and surgeons of that day we must mention, before all others, Antoine Maitre-Jean (Maitre-Jan, born about the middle of the 17th century), who disputes with Pierre Brisseau (1631–1717) of Tournay, professor in Douay, (the German Rolfink has no share in it) the honor of first recognizing the true seat of gray cataract in the lens, 1705. The Parisian surgeons Rémy Lasnier and François Quarré had still earlier (1650) expressed the same opinion. Pierre Borel (died 1689), Plempius, some decennia earlier, and Jacob Schalling (1615, Opthalmia, seu disquisitio hermetico-galenica de natura oculorum, Augentrost, Erfurt, Joh. Bischoff), held similar views in certain cases of cataract.

Brisseau, however, was the first to demonstrate by dissection that the lens is clouded in cataract. The Académie, to which he communicated his observations, at first declined to accept his conclusions, until Jean Mery (1645–1722), the famous chirurgien-major of the Hôtel des Invalides and surgeon of the Hôtel-Dieu, had demonstrated before them the pathological anatomy of the disease. With these may be joined Jean Baptiste Verduc, who has been already mentioned, and who described well the operations upon the eyes.

Otology, under the pen of Jos. Guichard Duverney (1648–1730), professor of anatomy at Paris, who was the first to describe diseases of the ear in accordance with their anatomical seat, grew up into a new department of science, after anatomy in his hands had supplied a more complete explanation of the internal structure of the ear, and Günther Christoph Schellhammer (1649–1716), in his work on the hearing (1684), had demonstrated that the "inborn air" (Aer ingenitus) of the Ancients was not to be retained as the special instrument of hearing. Dentistry also experienced some incidental advancement at the hands of Pierre Dionis, Jean Baptiste Verduc and other French surgeons. — Among the

γ. SPANIARDS,

who in this century sank more rapidly than any other people of history under the loss of their political supremacy and their commerce to the Dutch and English, utter domestic ruin was finally accomplished by their efforts to introduce unity of the faith. In these efforts the industrious Moors were extirpated under Philip III. That in these struggles they had no leisure to devote to the cultivation of science, and sunk low both in general culture and in medicine and surgery, will be readily understood by the student of the history of civilization[1]. Still Feliciano d' Almeida (died 1726) and Hieron. de Ayala (about 1672) are mentioned as surgeons.

δ. THE GERMANS

reaped no such benefits in the department of surgery from the Thirty Years' War, as did the French in their wars. That there were, however, men of enlarged experience, independent thought and careful observation among the German barber-surgeons of the seventeenth century, who still belonged to guilds and educated themselves simply by travel and private study, is proven at a very early period by

GEORG HYTELL, of Weissenfels in Saxony,

who displays much clearness of thought in his medical histories and marginal notes. He follows the surgical principles of Paracelsus, and gives a few judicious simplifications in the treatment of wounds, though he also subscribes to the oddities of his day,

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[1] In art alone they maintained their standing, and, indeed, in Murillo attained the acme of their fame. The other branches of intellectual life stood far beneath their level at an earlier day.

e. g. when he specially cautions against "Liebesspiel", even in the most trifling injuries.

Wilhelm Fabriz or Fabry (1560–1634, Fabricius Hildanus) of Hilden near Cologne

is specially eminent for his struggles, his knowledge, his experience and his erudition. In many of his traits he reminds us of Paré, and his motto engraved upon a copper-plate, "Omnis tutela a Deo", so characteristic of the humble sense of this pious man, recalls to us the similar motto of the great French surgeon. He had attended for a short time a high-school in Cologne, where he acquired his knowledge of the Latin language, which very many of the barbers of that day, who were held in such little esteem, acquired by their own efforts. He then came as an apprentice to Geneva and was finally appointed surgeon of the city and canton of Berne. His wife too was a skilful midwife, and on occasion did not hesitate to take a hand in surgery likewise. His children he lost by the plague. Fabriz was constantly associated with many learned physicians of his time, including Gregor Horst (1578–1636), professor in Giessen, and Hermann Couring, the latter of whom said of Fabricius that he could never think of him without silent thankfulness. Fabriz von Hilden was a receptive, rather than a productive spirit, like Würtz and Purmann. He was distinguished for a classical education, quite rare among the surgeons of that day — he even wrote Latin — for his knowledge of the ancient physicians, his rich experience and his skill in observation. He was likewise perfectly at home in the medical portion of therapeutics, and utilized this knowledge in the treatment of surgical lesions. In the invention of instruments he was particularly fertile, and he was even bold as an operator, being the first to amputate the thigh, an operation which even Paré had not ventured. Yet he still employed a knife-shaped cautery to obviate hæmorrhage in reduced patients (Gründer), although he was acquainted with ligation. Fabricius was an enemy of all novelties. Hence he was an active opponent of Würtz, and a partisan of trepanning, an operation greatly abused in the 17th century. Hilden was the first learned German surgeon, generally recognized and esteemed by the physicians. He did not embrace exclusively the maxim of his colleagues that surgery was *merely* a matter of practical dexterity, "though until this is acquired a few hundred peasants must perish". On the contrary, he demanded of the surgeon a good education, knowledge of anatomy and the study of the ancient physicians and surgeons, which he himself zealously pursued. Hence he was a cautious and very fertile author, respected as an equal by the learned physicians. Though he often supported obstinately the views of the Ancients, including Galen, he was yet a good observer and in practical life an able surgeon. He was also distinguished as an oculist and aurist (ear-speculum, 1580). Among other things he, or his wife, removed a particle of iron from the superficial layers of the cornea by means of a magnet.

A man of similar principles but of greater operative genius and originality, a born surgeon, was the intrepid

Matthias Gottfried Purmann (1648–1721) of Lüben in Silesia,

finally settled in Breslau, of whom we have already made mention. He was a bold and experienced operator, knocked about and educated in the field, and author of a military surgery. Thus in paracentesis of the thorax he regarded the entrance of air as of no very great importance, he trepanned forty times, practised transfusion, operated for aneurism, performed bronchotomy etc., and greatly lamented the low state of surgery in Germany. He regarded a knowledge of anatomy and of the experience of the ancient physicians as a prime requisite for the surgeon. Gunshot wounds he did not, like Hilden, consider poisoned; wounds of the intestine he treated with the simple suture; he was acquainted with the bimanual examination for stone, was an earnest opponent of the maltreatment of wounds by keeping them open, frequently cleansing etc. He was also a skilful oculist, and famous as a plague-physician. Proksch has also recently pointed out the fact that Purmann employed the speculum ani and vaginæ in the diagnosis and treatment of syphilis, though Ricord prides himself greatly upon his introduction of the same procedure, and regards it as a title of undying fame for himself.

The physician and surgeon JOHANN SCULTETUS (1595–1645) of Ulm, son of a poor sailor and educated at Padua, is famous as a surgical writer of this period. He was followed somewhat later, and in the same department, by

JOSEPH SCHMIDT,

(Instrum. chir., 1649), who recommends the drinking of urine in fever, a remedy still employed (instead of quinine) by the people along the Rhine. The author was formerly acquainted with a man who drank no water, but simply his own urine, until the day of his death, regarding it as a prophylactic against fever.

JOHANN VON MURALT (1655–1733) of Zürich,

was also a capable surgeon.

Among the German surgeons and writers on surgical subjects in the seventeenth century we must also mention: Paul Ammann[1] (1634–1691) of Breslau, professor in Leipzig, who was willing to practise castration in sarcocele only; Heinrich Meibom (1590–1655), professor of therapeutics, history and poetry at Helmstedt; Florian Matthis, who performed in 1602 the first gastrotomy to remove a knife which had been swallowed; Daniel Schwabe, a lithotomist and surgeon in Königsberg, who practised in 1635 the second gastrotomy for the removal of a fork; Georg. Gelmann (born 1633) of Bamberg, who described percutaneous ligation in 1652; Acoluthus of Breslau, who in 1693 practised a partial resection of the jaw; Ant. de Heide, established by experiment that the formation of callus was the new formation of bone; Justus Theod. Schonkoff, who proposed ovariotomy in 1685; Vohler, who in 1690 proposed amputation at the hip-joint, and executed the operation upon the cadaver; Mich. Bernh. Valentini (1657–1726), professor in Giessen; Johann Helfrich Jungken (1648–1726), physicus in Frankfort-on-the-Main, who plead in behalf of the union of surgery and medicine; Abraham Gehema, already mentioned, who deserves credit for his better treatment of wounded soldiers and his better education of the "Feldscheerer" (army surgeons). He was also a great eulogist of the Japanese moxa, which was introduced into popularity as a new remedy by the Dutch pastor Buschof in 1675; C. Horlacher, who discussed hernia in 1695; Johann Freytag of Zürich (about 1690), who attempted the extraction, and is regarded as the discoverer, of capsular cataract, and the following surgeons, who belong to the succeeding century: Ernst Conrad Holtzendorf, Surgeon-General of Prussia; Joh. Friedr. Zittmann (1671–1757, Zittmann's decoction) and others. Joh. Sigm. Elsholz (1623–1688) and Joh. Dan. Mayor (1634–1693), the former in Berlin, the latter professor in Kiel, occupied themselves with the venous injection of drugs (infusion). The latter, as well as Georg Abraham Mercklin (1644–1702) and Joh. Christoph Sturm (1635–1703) of Altdorf, also practised transfusion in

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1. Not to be confounded with the Swiss physician Johann Conrad Amman, who resided for a long time in Holland and published in 1692 a treatise on the education of the deaf and dumb.

[Amman's work was written in Latin and entitled "Surdus loquens, sive methodus, qua qui surdus natus est loqui discere possit", but it was soon translated into Dutch and English. Rev. Dr. John Wallis of Oxford also published a treatise on the instruction of deaf-mutes about the same period, and George Dalgarno (died 1687), a Scotchman residing in Oxford, published the first manual alphabet in England. (H.)]

Germany according to the principles of Libavius (chirurgia transfusoria, 1615). Marcus Banzer in 1640 proposed the preparation of an artificial membrana tympani from a tube made of the hoof of an elk, over which was stretched a portion of hog's-bladder. In this too our own century has followed the lead of the 17th, for Autenrieth, as we know, in 1815 reproduced these instruments from the swimming-bladder of the fish, and Toynbee in 1853 from Indiarubber. Werner Rolfink should also be mentioned here as an oculist,[1] and Brunner for his participation in the discussion of the question of the access of air to wounds or its exclusion therefrom, or prima intentio and suppuration. The latter process he no longer regarded as necessary and inevitable, as his predecessors had done. Among the

ε. Dutch,

whose surgery, as well as their medicine, enjoyed a high reputation during this century, especially in Germany, JOH. JAC. RAU (Ravius, 1658–1719) is commonly mentioned, though he was born in Baden.

Emerging from the cottage of the poor, he became first a barber, and in this capacity travelled about extensively, until finally appointed professor of anatomy and surgery in Leyden, where he improved the methods of instruction by the introduction of practical exercises in operating upon the cadaver. He was especially famous as a lithotomist after the method of Frère Jacques, and professes to have performed 100 such operations with success, though he gave no instruction upon this subject in his course of lectures.[2]

Genuine Dutch "Heelmeesters" (as surgeons were called), some of whom were distinguished also as anatomists were:

PAUL BARBETTE (died 1666) of Amsterdam; Pieter Verduyn;

JAC. VAN MEEKREN of the same place.

CORNELIS VAN SOLINGEN (1641–1687, according to Krul) in the Hague,

who was the most important of the Dutch surgeons and occupied himself with obstetrics and every department of surgery, including ophthalmology and otology, and exerted himself especially to improve surgical instruments;

HENDRIK VAN ROONHUYSEN (about 1660) of Amsterdam (operations for hare-lip) and Roger van Roonhuysen, who purchased Chamberlen's secret;

STEPHAN BLANKAART (1650–1702) of Amsterdam, who proposed the extraction of cataract;

CORNELIUS STALPAART VAN DER WYL (1620–1688) in the Hague;

GOTTFRIED BIDLOO (1649–1713), also a surgical teacher and an anatomist, whose "Anatomia corporis humani" etc. was adorned with 105 plates by Gerard de Lairesse.

ANTON NUCK, professor in Leyden (1650–1692), distinguished himself as a dentist, oculist and aurist (first paracentesis corneæ among the Moderns, cauterization of the antitragus for tooth-ache, artificial teeth made from the teeth of the hippopotamus, prohibition of the extraction of teeth in pregnant women); Johann Palfyn (1649–1730) of Ghent (obstetric forceps); Joh. Munniks (1652–1711) and others.

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[1] It may be remarked *en passant* that in "Martius Zeilleri Fidus Achates" etc., Ulm, 1675, "Augenbrillen wider den Staub" (goggles, protective glasses) are mentioned.

[2] It is an interesting fact that the history of many lithotomies in the 17th century was related in verse and illustrated with plates. Harvey's vivisections were also sung in hexameters!

ζ. The English

in this century for the first time enter the field of surgery with some important names. Thus the following surgeons of this period are mentioned:

Richard Wiseman, ordinary surgeon of James I.[1] (1603–1625), "The Pride of England", a bold and good operator, who at once took hold of every novelty, including the ligation of Paré, which was at that period little practised. He always amputated through the sound parts, favored the operation for strangulated hernia and still employed the trepan zealously, like most of the surgeons of that day. He also established the indications for herniotomy more clearly than his predecessors had done. William Cowper (1666–1709), a famous anatomist and surgeon, who also did not scorn dentistry; John Thomas Woolhouse (1650–1730), a famous but ignorant oculist, who travelled from place to place (and scarified with ears of barley!);[2] Alexander (died 1660) and William Read, the latter also an oculist; the somewhat later Sir John Taylor[3] (1708–1767, or according to others 1703–1772; died in Paris), who was a rank charlatan, and others.

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[1] Wiseman (1625–1686), sometimes called the "Paré of England", was in the service of all the Stuart kings from Charles I. to James II., and was appointed ordinary surgeon of Charles II. in 1661. After an extensive military experience in the Civil War and upon the continent, he settled in London in 1652. According to Haeser he favored primary amputation, especially in gun-shot wounds of the joints, treated aneurism by compression, and was the first author to describe accurately, and to employ the term, tumor albus. Though acquainted with the practice of ligation of vessels to control hæmorrhage, he prefers the use of the "Royal Styptic", and always has the actual cautery in readiness for use if required. Ligation he thinks requires too much light and too many assistants to be ordinarily used in battles on land or sea. Sprengel says that Wiseman also practised flap-amputation, and, according to Rockwell and Mastin, the first recorded operation of external urethrotomy for the relief of stricture is mentioned in his treatise "On the Ill Consequences of Gonorrhœa". This operation he says was performed by Mr. Edward Molins in 1652. Wiseman's chief work was entitled "Several surgical treatises", London, 1676. (H.)

[2] He used an instrument which he called a "xystrum" to scarify the conjunctiva. Woolhouse was oculist to James II. and William III., and at one time physician to the Hospice des Quinze-vingts in Paris, where he delivered lectures upon diseases of the eye. He is said to have proposed the operation of iridectomy as early as 1711, though it was first performed by Cheselden in 1728. All his works were written in French. His "Dissertation sçavante sur la cataracte et le glaucome etc." appeared at Paris in 1696. (H.)

[3] John Taylor, or "The Chevalier John Taylor" as he called himself, was a native of Norwich, a fellow-student of Haller under Boerhaave, and a man by no means ignorant, though a thorough charlatan. About the middle of the 18th century he travelled throughout Europe and part of Asia in a coach covered with painted eyes and bearing the inscription "Qui visum dat, dat vitam", lecturing upon diseases of the eyes, and operating indiscriminately upon almost anything that

Sir Christopher Wren, a savant as well as an architect, in the year 1657 was the first to devote attention to the injection of medicines into the veins, a subject specially studied in the seventeenth century and recently again essayed. His example was followed by Timothy Clarke (1664), Richard Lower (1631–1691) and others, and their experiments resulted in demonstrating that the same effects followed the administration of drugs by this method as when they were given per os.

[The following English surgeons and oculists also deserve mention here:

John Woodall, Surgeon-General of the East India Company in 1613, and one of the surgeons of St. Bartholomew's Hospital in 1615, who published in 1639 (2d edition) a surgical work entitled "Various treatises", which is interesting in the history of amputation;

R. Lowdham, a surgeon of Oxford, who is said to have been the first among the Moderns to practise the flap-method in amputation, and whose operation is described by the surgeon

James Young in his "Currus triumphalis ex terebinthina", published in London in 1679. Young was also the author of a treatise on wounds of the brain, with other works on surgery and anatomy. His "Medicaster medicatus" was written in reply to the "Compleat description of wounds, both in general and particular" of

John Brown (born 1642), ordinary surgeon of Charles II. and surgeon of St. Thomas's Hospital. The latter surgeon also wrote on tumors and "A compleat treatise of the muscles as they appear in the human body", London, 1681, with a treatise "of glandules and strumals, or king's-evil swellings", relating many wonderful stories of the efficacy of the royal touch in curing the latter.

John Colbatch, an English apothecary who had seen much service in the army and was finally admitted to membership in the College of Physicians, published in 1695 "A new light of Chirurgery", in which he extols the advantages of a vulnerary powder and hot water in the treatment of wounds and hæmorrhage. He also wrote on the gout, alkali and acid etc.

In 1622 appeared "A treatise of 113 diseases of the eyes and eye-lids", usually ascribed to

Richard Banister, though only the appendix, called "Banister's breviary", belongs properly to this author. The remainder of the work is said to be an English translation of Guillemeau's "Traité des maladies de l' oeil" by A. H. The "Breviary" discusses the theory of vision and the structure and diseases of the eye, and is said to indicate large practical experience rather than profound knowledge of ophthalmology.

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offered itself. He is said to have made an incision through the lower half of the cornea and then depressed or removed the lens with a plano-convex needle. He also professed to cure strabismus by dividing "the tendon of the superior oblique muscle of the eye". Of his numerous works, which were published in various languages, the earliest, entitled "An account of the mechanisme of the globe of the eye", appeared at London in 1730. (H.)

William Briggs (1641–1704) of Norwich, a pupil of Vieussens, superintendent of St. Thomas's Hospital under Charles II. and ordinary physician of William III., published an "Ophthalmographia" in 1676, which was highly praised by Newton and other savants. H.]

Even among the

η. Danes

a few surgeons gained prominence in this century. The peasant Kanut Thorbern became "famous" by means of an instrument for the amputation of the elongated uvula (an operation at that period considered very serious), and the elder Bartholin, who also occupied himself with surgery, communicated a knowledge of it to the profession. Besides these and the Swede Olof Rudbeck, Martin Bogdan (born 1631) and Heinrich von Moinichen (about 1665) also devoted themselves to surgery.

c. Midwifery, Gynæcology and Diseases of Children.

Midwifery in the seventeenth century experienced an advancement similar to, but more considerable than, that of its mother science, surgery, from which it began now to emancipate itself. The circumstance that it began finally to pass out of the hands of midwives (who, however, likewise experienced the benefits of improved education) into the care of men, and these simple surgeons, not physicians, contributed not a little to this advancement. In its scientific aspect it was promoted by the acquisitions of anatomy and physiology, which now supplied greater light as to the structure and functions of the sexual and parturient organs, and the subjects of generation and development. On the other hand, the invention of the obstetric forceps was at first of no benefit to practical midwifery, since it was kept secret. The 17th century must also be designated the century of version, inasmuch as in it this operation first received general acceptance.

That that most beneficent surgical instrument, the forceps, should have been invented so late, especially when we consider that physicians have always taken pleasure in, and distinguished themselves by, the invention of mechanical aids, is most astonishing! The first idea[1] of such an instrument, however, originated, as a matter of fact, in the year 1576, when P. Franco designed a three-bladed speculum for the delivery of the head without injury. But it was in the Huguenot family of Chamberlen, who emigrated in 1569 from Paris to London, that the actual forceps was invented and first employed. The original emigrant was William Chamberlen (died 1596), who, as J. H. Aveling[2]

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1. A passage in the writings of Avicenna (980–1037) would seem to indicate that the forceps were used by that physician in the delivery of living children. If so, the instrument never became common among the Arabians, and all knowledge of it had disappeared long before the days of Chamberlen. (H.)
2. The reader who desires to pursue further the interesting history of the Chamberlen family and the forceps, will find ample information in the little work entitled "The Chamberlens and the midwifery forceps: memorials of the family and an essay on the invention of the instrument", by J. H. Aveling M. D. F. S. A., Churchill, London, 1882. An interesting review of this work by R. P. Harris will also be found in the "American Journal of the Medical Sciences", vol. lxxxv, pp. 483–494. (H.)

showed in 1882, had *two* sons of the name of Peter, the elder of whom, born in Paris, died in London, a member of the guild of barber-surgeons, in 1631. According to the statement of Smellie, this Peter was the inventor of the forceps. Chamberlen's forceps was fenestrated and had no pelvic, but a marked cephalic, curve. The handles crossed like those of shears, whose form indeed served for their model. The vectis, hook and fillet were also known in this family. All this, however, was carefully kept secret, for patents at that period were unknown. Hugh Chamberlen, Sr. (grand-nephew of Peter, the inventor of the forceps), indeed, tried to sell the instrument in Paris about 1670 for 10,000 crowns, but, being unable to manage the test-case submitted to him by Mauriceau, he returned to London without accomplishing his purpose. At a later period (1699, having meanwhile acquired a fortune by his instrument and again lost it), he was compelled to fly to Holland, where he sold an instrument (probably merely the vectis) to Roger Roonhuysen. The vectis, however, had been already procured by Samuel Jansen from Hugh Chamberlen's brother Paul in England.[1] In this way it fell into the hands of others, who on their part again supplied it only for a high price, and in fact merely furnished the vectis. According to a decree of the Medico-Pharmaceutical College of Amsterdam, even as late as 1746 no physician could enter upon practice without the possession of this dearly bought[2] instrument. Finally the deception was exposed by Jac. de Visscher and Hugo van de Poll.[3] In England too the forceps was already known to the obstetricians Drinkwater of Brentford (1668–1728), Chapman and others, though this knowledge was by no means general.[4] Thus even seventy-five years after the occurrence of the invention, De la Motte was driven to utter the following just sentence (expressed, however, conditionally and wrongly directed against Palfyn) regarding the action of the Chamberlens and their associates in Holland: He who keeps secret so beneficent an instrument as the harmless obstetric forceps undoubtedly is, deserves to have a worm devour his vitals for all eternity, "for all human science, up to the present time, has not been able to find such an instrument!" Among the

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[1] The (probably) genuine Chamberlen instruments were discovered in 1813 at Woodham Mortimer Hall, near Maldon in Essex. They consisted of four forceps (of various degrees of perfection), three vectes, three crotchets and three fillets.

[2] It cost 1500–2000 gulden. (H.)

[3] This was in 1754, long after the Chamberlen forceps were generally known in England. (H.)

[4] Chapman, writing in 1733, says: "The use of the forceps (is) now well known to all the principal men of the profession, both in town and country." He himself had then used them for more than ten years at all events; Drinkwater left a pair on his death in 1728, and Giffard had employed the instrument in 1726. William Giffard was the earliest writer to describe and *depict* the midwifery forceps in 1734. Chapman mentioned the instrument in his work published in 1733, but gave no plate of his own instrument until his second edition, published in 1735. Palfyn exhibited his forceps before the Académie des Sciences in Paris in 1721. His instrument was, however, extremely imperfect — the blades were not fenestrated and had no lock — and it was not until Palfyn's instrument had been improved by Dusé of Paris in 1735 that it became of any practical use. At this period the forceps had been employed by Chapman more than twelve years, and, as he writes, were well known in England. It is, therefore, difficult to understand how Haeser in his last edition could write "To the fame of the invention of the obstetric forceps, one of the most beneficent inventions ever made, no one has any claim except Jean Palfyn" etc. While the claims of the Chamberlen family to the original invention of the forceps may, perhaps, admit of question, there can be no doubt that Palfyn was *not* the original inventor of this merciful instrument. (H.)

α. ITALIANS

prominent names in midwifery are remarkable by their absence in this as in the preceding century, and even incidentally little notice of obstetrical matters is found in their surgical works. The "Libro della Commare" (Manual for midwives) of Scipio Mercurio should however, be mentioned. Among the

β. SPANIARDS

also the subject was abandoned to the books for midwives (Pedro Nunnez[1]). Whether the thousand monasteries and nunneries in Spain at that day, by decreasing the number of births, had any specially unfavorable influence upon the development of Spanish midwifery must remain an open question. On the other hand the

γ. FRENCH

are especially prominent as promoters of midwifery in this century, when the predominance of France was marked even in the language of other nations, and especially among the Germans, in whom national feeling was almost entirely lost. The loose morals of the court and in the higher circles of society had at least the good effect of permitting men to act as obstetricians in ordinary cases, and not, as heretofore, simply in particularly bad cases requiring operative interference. This practice was diffused from France into other lands, for the domination of France in "the fashion" was at this period undisputed. In this connection we must mention as the successor of Bourgeois,

MARGUERITE (du Tertre, widow) **DE LA MARCHE**, chief midwife of the Hôtel-Dieu and authoress (1677) of a catechism for midwives. In this hospital too

FRANÇOIS MAURICEAU (died 1719) of Paris, president of the Collége de St. Côme,

was educated up to his subsequent position as an eminent obstetrician. He deserves the utmost credit for his introduction of version, for his management of placenta prævia and of separation of the head (tire-tête), and for his teachings regarding the normal course of labor — he ascribed the more difficult labor with boys to the greater size of the head — obstetrical examination etc. Mauriceau rejected the still prevalent assumption of a separation of the symphysis during labor, but was unacquainted with the minor pelvis.[2] He, however, rejected Cæsarean section on the living woman, a decision which met with decided support from Pierre Dionis. — Still greater reputation was acquired by

JULES CLÉMENT (1649–1729),

obstetrician to Mlle. la Vallière, the mistress of Louis XIV., and (in imitation of her example) accoucheur to the queen of Spain and other noble ladies, a position in which he greatly aided the transfer of midwifery into the hands of men. Beside him we may place

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[1] According to Eloy it was Francesco Nunnez, doctor of medicine in Alcala, who published a treatise "Del parto humano", Saragossa, 1638. (H.)

[2] The first edition of Mauriceau's "Traité des maladies des femmes grosses" etc. was published at Paris in 1668. (H.)

Guillaume Mauquest de la Motte (1655–1737) of Valognes, as skilful a surgeon as he was a famous and unprejudiced obstetrician. In the latter capacity he was a defender of mild methods of management, and especially of version in contracted pelves, in opposition to the treatment with cutting instruments still in vogue during this period. (He also recommended vertical elevation in dislocation of the shoulder).

Philippe Peu (died 1707), a surgeon of Paris, was an opponent of Mauriceau and an enemy of Cæsarean section.

Paul Portal (died 1703), who first proposed version by one foot, was an excellent observer and a defender of the powers of nature, as well as author of the doctrine that face presentations could be terminated without artificial aid.

Cosme Viardel (about 1671); finally

Pierre Amand (died 1720), a surgeon of Paris, invented a special machine for the extraction of the separated head, a matter which frequently claimed attention in that day, when version by the feet was in its bloom and the forceps were unknown. Among the

δ. Germans,

with whom, in spite of Roesslin, the practice of midwifery was still denied to men, a few midwives distinguished themselves as independent observers, particularly the gifted, capable, simple-hearted and pious

Justine Siegemundin, *née* **Dittrichin** (about 1690), the daughter of a minister. Falsely accused of pregnancy in her twenty-first year, she thenceforth devoted herself to midwifery, and, after years of practice in the country, acquired such reputation that she was called to Berlin as "Court Midwife to the Electorate of Brandenburg". She recommended rupture of the membranes for the production of artificial delivery in hæmorrhage, and was an especial advocate of bimanual version. How careful an observer she was may be judged from the following extract: "It may, indeed, happen that two children are contained in one bag of water, with one afterbirth and no caul between them; but this is very rare."— About 1700 Anna Elisabethe Horenburgerin, *née* Güldenapfel, the daughter of a regimental surgeon of Wolfenbüttel and subsequently a midwife in Brunswick, wrote a manual for midwives.— Margarethe Füsz, *née* Schiefelbein, (1555–1625), court midwife at Brieg, was a famous midwife, called even to Denmark and Holland. Veronika Iberin and Marg. Keilin, as well as the physicians J. G. Sommer in Arnstadt, Ch. Völter in Würtemberg, Wolradt Huxholz (born 1619) in Hesse, Ph. Schoenfelder in Bavaria and others, wrote manuals for midwives in the seventeenth century. What was the usual diet of the lying-in period is related by H. Guarinoni: 3 A. M., soup with 3 eggs and spices; 5 A. M., 3 scrambled eggs with chicken broth; 7 A. M., 2 soft-boiled eggs; 9 A. M., yolk-soup and toast, with a swallow of wine; dinner, a capon, some roasted birds, a partridge and finally some bread and spiced wine; 1 P. M., confectionery and wine; 3 P. M., roasted capon, fish, bread and wine (up to this time the infant had nursed at 5 A. M. and 1 P. M.); 5 P. M., omelette and wine (the child nurses for the third time); then supper of 5–7 different kinds of food; 7 P. M., capon soup; 9 P. M., the child nurses, and to obviate weakness on the mother's part she receives a plate full of confectionery, bread and wine. If the mother wakens about midnight she gets some more yolk-soup. It will be observed that the high and mighty mother gets rather the best of the child!

In this connexion it should be mentioned that the first recorded Cæsarean section *secundum artem* occurred in the seventeenth century. The operation was performed April 21, 1610 by the surgeon Jeremias Trautmann of Wittenberg in a case of hernia of the gravid uterus with development of a living child. The mother, however, died after 25 days, and after the uterine wound had already healed. The

ε. DUTCH,

who, as we have seen, had won the first position in the medicine of the seventeenth century, in midwifery also took at least the second place. Besides the two Roonhuysens already mentioned and C. van Solingen, Samuel Jansen (about 1681) and his rival Dionysius van der Steeren (died 1691; although a Doctor of Medicine he practised midwifery), Abraham Cyprian (about 1690), professor at Franecker, Gerard Goris at Leyden and Jan Bapt. Lamzweerde (about 1683) are worthy of mention as obstetricians ("Vroedmeesters", who were always surgeons also). One of the most eminent obstetricians who ever lived was

HENDRIK VAN DEVENTER (1651–1724).

At the age of seventeen he exchanged the art of the goldsmith for the pursuit of medicine. He studied in Gröningen, and practised at first in Wilwerd. From this place he travelled to Copenhagen, and, on his return, devoted his entire attention to midwifery, in which he was also assisted by his wife. He continued to practise the obstetrical art at the Hague until his death. Deventer wrote (1701) a famous work entitled "Manuale Operatien" etc., which acquired great popularity, especially in France. He deserves special credit for his observations on the normal course of pregnancy and labor, as well as the lying-in period — he holds that involution of the uterus is ordinarily completed in eight days — and for his teachings with regard to the minor pelvis (particularly the importance of the pelvic curve[1] — he does not mention the axis) and the doctrine of version. As regards the latter operation he recommended especially turning by the feet, but employed also cephalic version before, or shortly after, rupture of the membranes, resorting to direct traction of the head until it became engaged in the pelvis, or having recourse, if necessary, to external aid. Replacement of the prolapsed arm he regarded as always unnecessary etc. He also opposed instrumental interference as far as possible. He specifies obliquity of the uterus as the chief cause of difficult labor. — Moreover, "like a genuine Dutchman", Deventer sold a nostrum to relieve false pains.

JOHANN VAN HOORN (1661–1724) of Stockholm was of Dutch descent, but a student of Holland and France, and an eminent obstetrical practitioner in

ζ. SWEDEN,

especially in Stockholm.

In addition to other works, he wrote (1715) a manual for midwives with the curious title "Die zwo um ihrer Gottesfurcht und Treue wohl belohnten Wehemütter

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[1] From the time of the Ancients even down to the second half of this century the normal pelvis was believed to be too narrow for the birth of the child. A widening of its natural proportions to the required size by a separation of the parts, and especially of the symphysis, beginning during labor, was assumed, a doctrine to which even Paré and Severin Pineau (1597) subscribed.

Siphra und Pua", and won for midwifery in Sweden a position of respectability. Van Hoorn acquired especial credit by his obstetrical investigations and for teaching the safety of footling and face presentations, in which he followed the doctrines of Portal, his teacher. He likewise regarded the replacement of the prolapsed arm, for the purpose of accomplishing version, always unnecessary, and was the first who had a correct idea of placenta prævia as the cause of hæmorrhage during pregnancy. ("The afterbirth, which in the beginning of pregnancy has seated itself upon or over the mouth of the womb, and fastened itself there, to the great peril of the mother" etc.). — If the

ENGLISH,

by the invention of the forceps, proved their eminently practical disposition, obstetrics was yet, on the whole, only slightly developed among them. W. Salmon[1] and Nicholas Culpeper, towards the end of the century, published manuals for midwives, and James Primerose, a book on the diseases of women.[2] The great Harvey, however, by his incidental observations on the subject, threw English midwifery into higher relief. [Walter Needham (died 1691) also wrote a good treatise entitled "Disquisitio anatomica de formato fœtu", London 1667.]

GYNÆCOLOGY

was frequently studied separately, as well by physicians (Herlicius, 1610, Joh. Varandæus, 1619) as obstetricians. The same is true of

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[1] William Salmon was, indeed, a fertile medical writer during the last quarter of the 17th century, but I do not find any obstetrical treatise assigned to him. Probably the "English Midwife" of William Sermon, published in 1671 in London, is the work intended. The Chamberlen family were active obstetricians of much reputation during the whole 17th century. Peter, the inventor of the forceps, attended Henrietta Maria, queen of Charles I., in labor in 1628. Peter II. his brother (1572-1626); Peter III. (1601-1683), son of Peter II. and generally known as "Dr. Chamberlen" (he was an M. D.); Hugh (born 1630), son of Peter III.; Paul (1635-1717) and John (died 1699), likewise sons of Peter III., and Hugh II. (1664-1728), son of Hugh I., all devoted themselves to midwifery. In spite of a strain of insanity which seems to have run through the family, they all attained more or less reputation as obstetricians. Hugh I., as we have already mentioned, translated and published Mauriceau's Midwifery in 1672, but we have no independent obstetrical writings from any of the family. With the exception of Raynalde's translation of Roesslin, which he entitled "The Byrthe of Mankynde" and published in 1540, the earliest obstetrical work in the English language was James Woolveridge's "Speculum Matricis, or the Expert Midwives' Handmaid, Catechistically Composed", which appeared at London in 1671. An earlier edition is said to have been published at Dublin in 1670. Culpeper's "Director obstetricum" was published in 1681. Jane Sharp, an English midwife and contemporary of Siegemundin, also published in 1671 a manual for midwives entitled "The midwive's book, or the whole art of midwifery discovered, directing childbearing women how to behave themselves in their conception, breeding and nursing of children." The book, though based upon a practice of 30 years, is said to be extracted largely from the writings of French, Dutch and Italian obstetric writers. (H.)

[2] Primerose's "De morbis mulierum et symptomatis" appeared at Rotterdam in 1655. (H.)

THE DISEASES OF CHILDREN,

which were discussed, among others, by Michael Ettmüller (Valetudinarium infantile, 1675), Movius (Felix puerpera etc., 1675), Dan. Sennert, le Rat (1680), Denyan (1681), Nic. Fontano (1647), Walter Harris (De morbis acutis infantum, 1689), J. H. Jungken etc.

3. ANATOMY AND PHYSIOLOGY. PATHOLOGICAL AND MICROSCOPIC ANATOMY.

Normal anatomy, to which the newly created microscopic (and pathological) anatomy was added in the seventeenth century, cannot be easily exhibited apart from its connexion with the numerous physiological discoveries which the age brought forth. Indeed, the seventeenth century is the era of the foundation of modern physiology. Besides numerous other discoveries, this century produced two of the most important improvements and most brilliant acquisitions, which have ever been attained in the field, not only of physiological knowledge, but of knowledge in general—acquisitions, whose grandeur and importance for general medicine have not been equalled by that of any half dozen attained during thousands of years. We refer to the establishment of the circulation of the blood and the proof of the development of the higher animals from the egg — truths whose influence upon medicine has been of incalculable importance, and whose discovery strangely fell to the lot of a single great and gifted spirit, who thereby created the modern inductive-experimental physiology, and, indeed, we may say called into existence a new medicine. The great discoverer and indefatigable and conscientious investigator — he was no savant, for these scarcely ever mark an epoch in either science or culture in general — to whom we owe these great acquisitions, which to-day appear to us so familiar and so simple, was the Englishman

WILLIAM HARVEY (April 1, 1578—June 3, 1657) of Folkestone in Kent. The eldest of nine brothers and sisters, at the age of ten years he attended the grammar-school of Canterbury, and at fifteen he entered Cambridge, and then visited Padua in 1599 in order to study medicine. Here, during the five years of his residence, he was a pupil of Fabricius ab Aquapendente, Casserio and Thomas Minadous (1554–1604). The fact that Fabricius in his anatomy paid little attention to the heart was the indirect occasion which led Harvey to those special studies that terminated in his ever memorable discovery. Upon his return to England, Harvey, now 26 years old, married the daughter of the physician Lancelot Browne and was first appointed physician to St. Bartholomew's Hospital in London (1609), and then professor of anatomy and surgery [at the College of Physicians (1615)]. He was also appointed extraordinary physician to the learned and whimsical James I., and ordinary physician to Charles I., the fickle son of this theological pedant. To the latter, who was subsequently beheaded (Jan. 30, 1649) in the English Revolution, Harvey dedicated his chief work. He was also a busy practitioner[1] until by the publication (1628) of his doctrines, which he, however, had already taught in the College of Physicians since 1616, he lost a great part of his practice, and was even regarded as demented. Harvey was driven from place to place in England by the Civil War, and thus came to Oxford, after the surrender of which to the Parliamentary troops, he resided in London and its vicinity with his brothers, who had become rich by commercial pursuits, and especially with his favorite brother Eliab. His modesty led him to decline the high distinction of the presidency of the College of Physicians (offered him in 1654), but he was honored by having his bust placed in the hall of that society. He also visited Germany and Vienna in the train of a nobleman, and on his journey endeavored to convince his opponent Hofman in Altdorf personally by experiments of the truth of his doctrine. He lived a modest and retired life, occupied chiefly with his studies — in his later years he busied himself particularly with mathematics — until his death at a good old age in London. He was buried on June 26th at Hempstead in Essex (where Sir Rowland Hill, 1795–1879, the reformer of postal affairs, also died), the peer of the great spirits of his epoch. A monument to the memory of Harvey was erected at Folkestone in 1881, and on Oct. 18, 1885, his remains were placed in a new marble coffin and solemnly laid to rest in Hempstead Church near Saffron Walden.

It is characteristic of the fate of new truths, as well as of that authority-loving age, that Harvey's immortal work ("Exercitatio anatomica de motu cordis et sanguinis") was unable to pass censorship in England, and therefore appeared in 1628 (Harvey's 50th year) in a foreign country, viz. at Frankfort-on-the-Main, while his second treatise on the same subject, in reply to the younger Riolan, was published at Cambridge in 1649. He allowed his "Exercitatio de generatione animalium" to be published at London in 1651, but only on the persuasion of a friend. The earlier attacks upon him had made him unduly sensitive to the new ones which he anticipated. Other works from his pen have been lost. Some manuscript notes, the report of a dissection, and a few sketches and letters from his pen are still in existence.[2]

Refuting the erroneous ideas of the Ancients, and with an eye upon the teachings of Aristotle, Galen, Colombo and others — the work of Serveto was unknown to him, while Aristotle and Galen were cautiously opposed — but on all new points proceeding only upon purely experimental methods[3] Harvey set forth the doctrine of the circulation as it is held to-day. He divided the circulation into three sections: the lesser, the greater and that of the heart itself. In his prolonged investigations he made use of both warm and cold-blooded animals, but differed from our "exact" investigators of the present day in not describing minutely each individual experiment, but contenting himself with adducing his results and leaving to deduction its just place. He computed the mass of the blood, and thus proved that there must be a circulation, for all the blood could not be employed in nutrition, nor could it all be newly supplied by the absorption of nutriment. Of "spiritus" he said that he had never found anything of the kind in his dissections. He still lacked, however, the intermediate bond of the capillary zone. In place of this he assumed larger porosities of the flesh and vessels, though he also employed the term "capillaries". He still regards the heart as the place for the improvement of the blood and the renewal of its strength, and calls it "the sun of the microcosm, the beginning of life, the household-god of the body, the author of everything. the foundation of life". Arteries and veins differ in use, function and thickness, not in structure; the veins contain crude. used-up blood; the arteries, concocted, nourishing and perfected blood: otherwise they are alike simple channels for the blood. He also erred in many subordinate points, e. g. in respect to the quantity of blood driven into the arteries at each systole of the heart, which he assumed to be half an ounce; but even if his anatomical description of the structure of the heart was insufficient and, indeed, imperfect. he was certainly the first who introduced the heart into its right place in the circulation in accordance with its mechanical significance and action -- an advance which cannot be disputed or denied him. The main facts of his exposition remained quite indisputable, although in his own day they were heavily assailed, and these accessary matters were eagerly utilized as a means of attack. Harvey proved "that the blood passes through the lungs and heart by the pulsation of the ventricles, and is sent for distribution to all parts of the body, where it makes its way into the veins and pores of the flesh, and then flows by the veins from the circumference on every side to the center, from the lesser to the greater veins, and is by them finally discharged into the vena cava and right auricle of the heart, and this in such a quantity, or in such a flux and reflux, thither by the arteries, hither by the veins, as cannot possibly be supplied by the ingesta, and is much greater than can be required for mere purposes of nutrition; it is absolutely necessary to conclude that the blood in the animal body is impelled in a circle...." The previous doctrine of the importance of the liver, and of the "spirits" in the heart, was first overthrown by him, and with it fell the four immemorial fundamental humors and qualities. "Voici Harvey! Comme au jour de la création, le chaos se débrouille, la lumière se sépare des ténèbres! exclaims Daremberg, justly, though with most too much Gallic magniloquence.

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[1] It is very evident from Harvey's section on "Parturition" that he was familiar with the practice of obstetrics and gynæcology, employing the speculum, dilating the uterus, removing moles etc. Aubrey reports that "My Lady Howard had a cancer in her breast, which he (Harvey) did cut off and seared", and Harvey himself reports his removal of a sarcocele. (H.)

[2] The manuscript of Harvey's original lectures delivered at the Royal College of Physicians in and after 1616, including his earliest observations on the heart and the circulation, were rediscovered in the British Museum in 1877. The handwriting is said to be so crabbed and the lectures are filled with so many abbreviations, that no one but an expert could decipher them. (H.)

[3] With this object he investigated animals of the most varied classes, insects (even lice), sea-animals etc.

That so important a discovery, which cleared up the ancient and time-honored obscurities and overturned the whole physiological and philosophical foundations of the medicine of the past (including the speculative novelties of Theophrastus von Hohenheim) by certain results gained through the inductive method, necessarily created among medical men both opponents and partisans in great number, is self-evident.

Of course the opponents were first in the field. Two years after the appearance of Harvey's book, which was founded upon the researches of 26 years, appeared a polemical treatise composed in fourteen days by James Primerose[1] of Bordeaux, practising at Hull in Yorkshire, in which the author declared the impossibility of surpassing the Ancients and the younger Riolan. Riolan himself, of course, also wrote in opposition to Harvey, and was the only one of his opponents to whom the latter deigned a reply. In Paris, at the instance of Riolan and by a decree of the Faculty, the teaching of Harvey's doctrine in lectures was prohibited. Æmilius Parisanus (died 1643 in Venice) of Rome, a physician at Venice, who, like Harvey, had been a pupil of Fabricius ab Aquapendente, and who had been opposed by Riolan as an ignoramus in anatomy, joined the physicians already mentioned, and, among other things, declared that he had seen the heart beat when perfectly bloodless, that blood could not flow backwards and forwards at once in the arteries, that no beating of the heart, no sound was to be heard, as Harvey affirmed, etc.

KASPER HOFMAN (1572–1648)

too, the savant and professor at the Nuremberg university in Altdorf and a Humanistic physician, was not at first dissuaded from opposition by even the personal letters and efforts of Harvey, but at a later period he changed his opinion. Hofman was the son of a poor blacksmith in Gotha, and remained poor, as well as sick, all his life. He was an indefatigable worker and a man of great love of the truth, but rough in his manners and therefore greatly disliked.

VOPISCUS FORTUNATUS PLEMPIUS (1601–1671) of Amsterdam,

professor in Louvain, on the other hand, from an original opponent of Harvey — he wrote against Descartes also, who agreed with the new theory — became subsequently a complete and warm supporter of his doctrine.

Among the large number of complete or partial opponents of Harvey belong: Joh. Vesling; Cæcilius Foli (Folli, Folius, born at Udine in 1615), professor in Venice, who with J. J. Rau, rendered excellent service in increasing our knowledge of the malleus and the membranous labyrinth, and called to his aid in the present dispute an accidental case of persistence of the foramen ovale; Peter Gassend, to whom a similar case had been shown by a certain Payan, and who also selected it for the basis of his opposition; Van der Linden and P. J. Hartmann, who took up the subject philologically, and claimed (the former in 27 "exercitationes") that Hippocrates or Solomon possessed a knowledge of the circulation; Harvey's friend Giov. Nardi (about 1656), a physician of Florence, and Olaus Worm (the Wormian bones, 1588–1654), Fortunatus Licetus (Liceti, 1577–1657), professor at Pisa, Bologna and twice at Padua, with many others.

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[1] Primerose was of Scotch descent, but born and educated in France. He graduated in medicine at Montpellier in 1617 and subsequently came to England, where he settled at Hull and acquired the reputation of a skilful physician. In 1630 he proposed to the king that if his Majesty would institute a lecture in Westminster or London, he (Primerose) would teach the same four times a week without payment, because many were "constrained to go out of the kingdom to learn Physic." I do not find that his offer was accepted. Primerose's "Exercitationes et Animadversiones in Librum de motu cordis et circulatione sanguinis, adversus Guilelmum Harveum" was published in London in 1630. A Duncan Primerose was one of the ordinary physicians of James I. in 1615. (H.)

At the same period when Harvey's first opponent emerged from obscurity, his first important and open supporter appeared. This was Werner Rolfink (1599–1677) of Hamburg, professor of medicine, anatomy, botany and chemistry at Jena. He was subsequently joined by Herm. Conring, and these two outweighed a whole host of opponents. Besides these and the physicians mentioned above, other adherents of the new doctrines were found in De le Boë (Sylvius); Thom. Bartholin; van Beverwijck (1594–1647); Jan de Wale (Walæus, 1604–1649), of Koudekerke in Zeland, professor in Leyden, who based his acceptance upon his own investigations; Roger Drake, under the auspices of Wale; Hendrik de Roi (Regius, 1598–1679), a famous professor in Utrecht; Jac. de Back (about 1649), a physician of Rotterdam; Joh. Trullius of Rome; George Ent (1604–1689) of Sandwich in Kent, Harvey's best friend (who saved to posterity his really grander and more profound work on Generation) and a physician of London; Jean Pecquet; Paul Marquard Slegel (Schlegel, 1605–1653) of Hamburg, professor in Jena and subsequently city-physician of his native city, and many other reputable physicians.

A bond of union and intermediary system between the arteries and veins, unknown up to this time yet quite essential, was discovered by the great Marcello Malpighi (1628–1694) of Crevalcuore near Bologna, professor in the university of the latter city, subsequently at Messina, and still later ordinary physician to the Pope at Rome. He discovered the capillary circulation (1661) in the lungs and mesentery of frogs, and in 1665 the blood-corpuscles. He likewise discovered the lung-cells, the cutaneous glands and the pigmentary layer of the skin (rete Malpighii), which latter discovery furnished the first explanation of the color of the colored races. After Malpighi, William Molyneux, professor in Dublin, observed the capillary current in a lizard (1683), while Anton van Leeuwenhoeck (1632–1723) from 1688 onward made his observations on the larvæ and feet of frogs, on eels etc. In these he was able to study the blood-corpuscles (including the white corpuscles) more thoroughly than Malpighi had done. Finally William Cowper (1666–1709) saw the passage of the arterial into the venous current in the mesentery of the cat (1687). —The capillary connexion of arteries and veins was first demonstrated by means of injections and microscopic observation by the already mentioned Dom. de Marchetti (1626–1688) in Padua (who, by the way, was so devoted to trepanning that he even performed this operation for syphilitic cephalalgia), but was best shown by Friedrich Ruysch[1] (1638–1731), professor at Amsterdam, the famous inventor of minute injections and himself a skilled injector. Ruysch also advanced anatomy by the formation of anatomical collections, one of which was brought into Russia by Peter the Great at an expense of about $75,000. The Russian transporters of the collection, however, drank the alcohol in which the preparations were preserved, and a portion of it was thus ruined. Ruysch also gave his name to the tunica Ruyschiana of the eye.

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[1] Ruysch, like Stromeyer in our own day, had a daughter Rachel (1664–1750), who was a painter of flowers and also assisted her father, but left no more paintings than children.

The doctrine of the circulation was also further developed by Alexander Maurocordatus (1637–1710), born of Greek parents in Constantinople, educated in Padua, and subsequently Turkish embassador in Vienna. Maurocordatus also investigated the mutual relations of the respiration and circulation.

Further illustration and amplification of the doctrine of the circulation resulted from the more careful investigations into the formation and structure of the heart, an organ which every one — including Harvey himself — entangled in the views of the Ancients, continued to consider subordinate to the liver in its importance with respect to the circulation and the appropriation of nutritive material; for no one was entirely free from the authority of Galen. Nicolaus Steno (Stenson, Stenonis, Stenonius etc., 1638–1686), at first a professor in Copenhagen, then bishop *in partibus* of Titiopolis and a peripatetic convertor of heretics, first proved that the heart was a muscle, and that consequently it contracted actively and expelled the blood.[1] He was likewise the discoverer of Steno's duct, which he found during his residence in Leyden and Amsterdam.

The capacity of the heart for contraction under irritation, even after death, was shown by Joh. Jac. Harder (1656–1711), professor in Basel, and by Peyer. In regard to the movements of the heart and other animal motor phenomena (including even nutrition), Glisson, the successor of Harvey in the professorship of anatomy and surgery in the College of Physicians, taught an "irritability of the fiber", as well as of the fluids, under the influence of external and internal irritation — a doctrine discovered by the deductive method. These irritants always elicit motion, but only attain to the consciousness when an excess of the irritation of the fiber upon the nerve occurs. "Life expresses itself in matter, in that the latter acts, moves. This takes place through, and consists in, reciprocal action. The ground of motion is irritability" — such was the essence of his doctrine. In this theory he was the predecessor of Haller, who, however, went to work inductively.

Richard Lower (1631–1691) of Tranmore in Cornwall, practising in London (tuberculum Loweri), and Raimond Vieussens (1641–1716) of Rouergue, professor in Montpellier (Fossa ovalis etc.) indicated more precisely the position, structure etc. of the heart, while Thomas Bartholin[2] (1616–1680) disputed with Olaus Rudbeck (1630–1702), professor in Upsala, the discovery of the intestinal lymphatics and their connexion

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1. In geology, whose foundation he laid, Steno was the first "Neptunist", while Leibnitz was the first "Plutonist".
2. Son of Casper Bartholin Sr. (1585–1629), professor in Basel. The latter's youngest son, Erasmus, was also first professor of geometry and then of medicine in the same city. Thomas Bartholin was the father of Casper Bartholin Jr. (1655–1738), professor of physics and anatomy in Copenhagen.

with the thoracic duct and left subclavian vein. For up to this time it was the prevailing opinion that the lymphatics of the intestines went to the liver,[1] since it was assumed that the chyle was absorbed by the veins of the intestine and flowed through them to the liver. This error was dispelled by the triple discovery of the lymphatics of the intestine and their connexion with the thoracic duct, on the one hand, the chyliferous vessels, their source, on the other, and finally the thoracic duct itself. The first discovery was made by Rudbeck in 1651; the second in 1622 by Caspar Aselli (1581–1626), professor in Pavia. The latter, in one of the vivisections so frequent even at that time, discovered the chyliferous vessels in the dog, while Fabrice de Peiresc (1580–1637), a wealthy amateur in medicine, by the investigation of the body of a highly fed malefactor two hours after his execution, led to their discovery in man. Finally the discovery of the thoracic duct and its termination in the subclavian vein was made (also in the dog) in the year 1647 by Jean Pecquet, (1622–1674) of Dieppe, professor in Montpellier, and Fellow of the Académie, who, however, thought it a vein. Jan van Horne (1621–1670), professor of anatomy in Leyden, in the year 1652, however, first succeeded in demonstrating the same vessel in man. Harvey disputed the correctness of the discovery on theoretical grounds. He too must bring his offering to prejudice!

Johann Vesling (1598–1649), a native of Minden in Westphalia and professor in Padua, had discovered the thoracic duct shortly after Pecquet. Jacques Mentel (1599–1670) confirmed the discovery of Aselli, but was merely a witness of the discovery of the thoracic duct, not Pecquet's predecessor in that discovery. The English, however, claimed for George Jolyff,[2] a physician of Cambridge, the discovery of the lymphatic vessels, for much difference of opinion exists with respect to the precise persons and the exact dates to which the anatomical discoveries of this period belong.

While, as we have seen, the study by others of the doctrine of the complementary circulation of the lymph and chyle was associated with Harvey's name and his doctrine of the circulation of the blood, the same great investigator, by his work on this subject, also gave the permanent foundation to a new and fruitful cultivation of another department—the doctrine of generation and development. His "Exercitationes de generatione animalium" etc. are, if possible, still more important in their range than his work on the circulation, but are far inferior to the latter in precision of thought and experiment, are not free from repetitions and are somewhat verbose. In this field he was the pupil and successor of his master, Fabricius ab Aquapendente, whose endeavors he carried to completion. Harvey not only investigated, like Fabricius, the eggs of the fowl, but also the embryos of quadrupeds, e. g. hinds and does (on the latter of which Bischoff also, at a later period made new investigations), and thus finally arrived at his famous proposition: "Ovum esse primordium commune omnibus animalibus".[1] This proposition was completed on the male side, and the theory of generation founded, through the discovery of the so-called spermatozoa (animalcula, 1677) by a German student in Leyden, Ludwig von Hammen (1652–1689) of Dantzig, then only 21 years of age.[2] He showed them to the renowned miscroscopist Anton van Leeuwenhoeck, originally a mechanic, subsequently a physician of Delft. By the latter the semen was at once installed in the place of the egg in Harvey's theorem. The germ of the future soul was claimed for the spermatozoa, and they themselves were declared to be living animals of both sexes, capable of coition etc. For this reason the philosopher Leibnitz at once declared the spermatozoa immortal, while the truth is only that by their means the species (as we express it) becomes immortal. That alteration in Harvey's theorem may depend too upon the actual discovery (made by Leeuwenhoeck) of sperm-cells in the uterus of a bitch, while in the egg these had not been observed. According to Leeuwenhoeck, therefore, the spermatozoa are transformed into the embryo, while the eggs merely supply the requisite nourishment.

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[1] Upon this view Helvetius subsequently based a theory of inflammation, which Jean Besse of Rouergue met with the assertion that in such a theory capillary obstruction only (nowadays "thrombosis" and "embolism") came into consideration.

[2] Wharton claimed that the lymphatics were discovered by Jolyff in 1650. (H.)

Of course parties (Ovists and Animaliculists) arose from two such opposite views (correct, as the sequel showed, only in their union), and these found a fruitful subject for dispute in the further discussion of the history of development, particularly in reference to the mode of nutrition of the embryo. Harvey erroneously denied all immediate connexion between the embryo and the maternal body, and endeavored to prove this complete separation of the two by the existence of the egg-membranes. He likewise ascribed little importance to the ovaries, but, like the Ancients, thought that fecundation took place by means of the aura alone. Yet he claimed (correctly) a difference in the pulse-beat of mother and child—at that time something unheard of!

The egg-theory (which forever deprived the theory of a generatio æquivoca of its previous estimation) was supported at once directly and indirectly by a number of important anatomical and developmental discoveries, which gained in weight, in that period so fruitful in new authorities, by the importance in other directions of the men who labored to perfect this subject.

Thus light was thrown upon the structure of the testicle by the famous anatomist Nathaniel Highmore (1613–1685), a physician of London, who described more accurately the so-called corpus Highmorianum, the seminal ducts and the epididymis. His investigations were supplemented by a certain Aubery in Florence, while Jan van Horne pointed out that the so-called female testicles were ovaries, a fact previously affirmed by Stenon, who also showed the muscular nature of the uterus. Jan van Horne must not be confounded with the Swedish obstetrician Hoorn. The former was born at Amsterdam in 1621 and died in 1670 in Leyden, where he held the position of professor of anatomy and physiology.

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[1] "Omne vivum ex ovo" does not occur in his book, but is a later and incorrect abbreviation of Harvey's proposition.

[2] According to the Dutch (who must have also an inventor of printing of their own), the discovery of the spermatozoa was made by Joh. Ham (died 1723), a Dutch student of that day.

[Haeser, on the authority of Halbertsma and Leeuwenhoeck himself, says Ham, a student at Leyden, was the real discoverer of the spermatozoa. (H.)]

REGNER DE GRAAF (1641–1673) of Schoonhoven,

a physician in Delft, proved (1672) that the so-called female testicles secrete no female semen, as had been hitherto assumed, but are ovaries in the true sense of that term, similar to those of oviparous animals. Stenon too in 1667 had expressed this opinion (Lauger). He pointed out the follicles still called Graafian, which, after rupture, form the corpora lutea, but he did not consider them the eggs proper, because the eggs found in the uterus after fecundation were always smaller than these follicles. He believed these eggs reached the uterus through the tubes, and were fecundated only by the aura. De Graaf in 1664 also instituted the first experiments on the secretion of glands, by tying a tube in the duct of Wirsung in order to collect the secretion of the pancreas. He was likewise the first to inject vessels, for which purpose the physician next mentioned invented a hardening material.

JAN SWAMMERDAM (1637–1686),

a pupil of Horne and friend of Sylvius de le Boë, also proved the ovarian character of the female testicles, and supported his views by comparative observations in the plant and insect kingdoms. He was the first to prove that the queen bee was a female. Special light was thrown upon the history of development proper by the London anatomist and physician

WALTER NEEDHAM (died 1691),

who, though he assumed intrauterine respiration, taught that nutrition was effected by blood from the placenta, and distinguished the fœtal and maternal divisions of the latter organ. He was acquainted also with the umbilical vesicle, the changes of the pregnant uterus etc. The great investigator Malpighi too again utilized the microscope in the history of development.

CHARLES DRELINCOURT (1633–1697) of Paris,

professor in Leyden, held that fecundation took place in the uterus, and, in opposition to the doctrine of the Ancients, demonstrated the viability of the eight-months fœtus, while

NICOLAUS HOBOKEN (1632–1678),

professor in Utrecht and Harderwyk (about 1669), described more accurately, and delineated, the placenta and envelopes of the ovum.

On the side of Harvey's egg-theory was arrayed too the versatile partisan Franc. Redi (1626–1697), naturalist, physician of Cosmo II. of Tuscany, and poet. With Leeuwenhoeck and Swammerdam he opposed the generatio æquivoca. Beside him stood Johann Bohn, Theodor Kerkring (1640–1693; valvulæ Kerkringii, vasa vasorum), Rolfink, Caspar Bartholin, Jr., who was the first to prove the discharge from the female genitalia (heretofore considered female semen) to be vaginal and uterine mucus; Claude Perrault, who was also a supporter of the doctrine of Panspermism, Franc. Maria Nigrisoli (1688–1727), professor in Ferrara, and finally Antonio Vallisnieri (1661–1730), professor in Padua, whose arguments against the functions of the spermatozoa (he considered them merely transient visitors, because he had found them in the discharged vaginal mucus) met with much sympathy at that period and later; and some others.

Among the opponents of Harvey, or followers of Leeuwenhoeck's seminal doctrine, we must mention: Nic. Hartsoeker (1656–1725) of Amsterdam, for a time professor in Heidelberg, who held that the air was filled with animalcula, which settled upon plants, and passed thence into infusions, where they were then found with the microscope; François Plantade (about 1699), who portrayed the spermatozoa in the form of homunculi; Martin Lister (1638–1711), who regarded their movements as excitors of the sexual orgasm, and thus of sexual pleasure; Hieronymus Barbatus (about 1676), who still clung to the ancient theory of the mixture of the male and female semen; Phil. Jak Hartmann; Giov. Maria Lancisi; Girolamo Sbaraglia (1641–1710), professor in Bologna, and many others. Among the latter, however, we must distinguish Nicolas Andry (1658–1742), who correctly affirmed the entrance of the spermatozoa into the ovum, but erred in believing that they developed themselves, and in holding that they might penetrate into the body from the surrounding air. He already observed that boys before puberty and patients suffering from gonorrhœa had no spermatozoa.

In connexion with the investigations concerning the circulation of the lymph and chyle, whose modus operandi was disclosed through the discovery of valves in the lymphatic vessels by Swammerdam, Gerard Blaes (professor in Amsterdam, died 1662) and Ruysch, stand the numerous discoveries with respect to the glands. Thus Thomas Wharton (1610–1673), professor in Oxford, who was almost the earliest to devote attention to the general theory of the glands, discovered the duct called after him Wharton's duct. He considered the ligamenta rotunda, though not hollow, the excretory ducts of the female testicles, and the tubes as passages which facilitated the fecundation of the female semen by the male. Francis Glisson (1597–1671) investigated especially the liver, though the same had been done before him by Adrian van den Spieghel of Brussels, professor in Padua (1578–1625). Glisson taught, however, that the lymph was secreted by the nerves as well as by the smallest arteries. Anton Nuck was the first to demonstrate the injection of the lymphatics with quicksilver, and studied excellently the doctrine of the glandular system. Needham and Stenson discovered the excretory duct of the parotid: August Quirin Rivinus (German, Bachmann), that of the sublingual gland, though the latter discovery was also ascribed to Casp. Bartholin Jr. Johann Conrad Peyer (1653–1712), a physician of Schaffhausen, and Joh. Conrad Brunner (1653–1727) of Regensburg, professor in Heidelberg, discovered the intestinal glands, which bear their names. The excretory duct of the pancreas was discovered in the dissecting room of Vesalius at Padua by his prosector Georg Wirsung[1] of Bavaria (assassinated by a physician at his own door, in 1643) and Moritz Hoffmann (1621–1698) of Fürstenwalde in Brandenburg, subsequently professor in Altdorf. Hoffmann in 1642 had discovered the so-called duct of Wirsung in the fowl and pointed it out to Wirsung, who then described the duct in man as his own discovery. The Roman professor Antonio Pacchioni (1665–1726) of Reggio described the so-called

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[1] Not to be confounded with Christopher Wirsung, who wrote a famous dispensatory in 1568.

Pacchionian glands: Clopton Havers (about 1691), a physician of London, the so-called synovial glands. The glands of the sexual organs were described by William Cowper, though the so-called Cowper's glands had been already seen by Mery and their existence had been confirmed by Duverney. Alexis Littre (1658–1725), a physician of Paris and member of the Académie (he devised in 1710 a method for establishing an artificial anus,[1] which has since borne his name), described the glands (Tyson's), which were more thoroughly made out by Edward Tyson (born 1651), professor of anatomy in London. Caspar Bartholin described the glands which bear his name, though they had been previously discovered by Duverney in the cow. By this discovery of the glands of Bartholin, the long dispute regarding the female semen, i. e. the origin of the fluid secreted by the female during coitus and regarded as semen, was at least partially settled. Guillaume des Noues in 1681 saw the so-called ovula Nabothi, subsequently again discribed by Martin Naboth (1675–1721), professor of chemistry in Leipzig. Heinrich Meibom (1638–1700) of Lübeck, professor in Helmstädt, discovered the glands of the eye-lids which bear his name. Lorenzo Bellini rendered good service in explaining the structure of the kidneys.

Works devoted to anatomical studies (besides those of the 16th century) were still in vogue. Among the authors of these we may mention: Joh. Riolan Jr. (Anatomia seu anthropographia et osteologia, Paris, 1626, Encheiridium anatomicum, 1648); G. Bidloo (Anatomia humani corporis, with 105 plates, Amsterdam, 1685. These plates were used by William Cowper in his "Anatomy of human bodies", Oxford, 1698, Cowper merely supplying the text and adding 9 indifferent plates of his own); M. Lyser (Culter anatomicus, seu methodus humana incidendi corpora, Copenhagen, 1653 — a guide to dissection); Thomas Bartholin (Anatomia reformata etc., 1651); Thomas Verheyen (Anatomia corporis humani, Louvain, 1683); Joh. Vesling (Syntagma anatomicum, 1633); Spieghel (De humani corporis fabrica cum tabulis, Venice, 1627); Nathaniel Highmore (Corporis humani disquisitio anatomica cum 18 tabulis, 1651); John Browne (Myographia nova etc., with 37 plates by R. Whyte, London, 1684), ordinary surgeon of Charles II.; Pieter Paaw (Pavius; Primitiæ anatomicæ de humani corporis ossibus, 1615); Leeuwenhoeck (Anatomia, Lugd. Bat., 1687); Ruysch (Thesaurus anatomicus cum. fig. æn., 1701); Giulio Casserio (Tabulæ anatomicæ 78 — 20 of them supplied by Dan. Bucretius of Breslau, Frankfort-on-the-Main, Merian, 1632); Dom. de Marchetti (Anatomia, 1652); Malpighi (Epistola de lingua, Bologna, 1665); Severini, Jasolini et Cabrolii varia opuscula anatomica, Frankfort, 1668. One of the most widely used handbooks of anatomy was "L' anatomie de l' homme" (Paris, 1690) of P. Dionis, which contained the doctrine of the circulation and was translated into other languages, even into Chinese; Carlo Cesio (Cognitione de muscoli del corpo humano per il designo opera di C. Cesio Arn. v. Westerhout formio, Romae, 1697, with 18 plates) etc. etc. [To whom we may add Alexander Read[2] (The manual of the anatomy or dissection of the body of man,

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[1] Colotomy, which was first performed, however, by Pillore and Duret in 1776.

[2] The Catalogue of the Library of the Surgeon-General's Office mentions a work entitled: "Read or Rhead (A.) Σωματογραφία Ἀνθρωπίνη. Or a description of the body of man. By artificial figures representing the members, and fit terms expressing the same, n. p., 1616." Is this an earlier edition of the same work? (H.)

1634); H. Crooke (*Μικροκοσμογραφία*, — A description of the body of man, London, 1631, 2d. ed.); Thomas Winston (1575–1655; Anatomical lectures at Gresham College, 1659); Robert Bayfield (Exercitationes anatomicæ etc., 1660); Sir Charles Scarborough (Syllabus musculorum, 1676); Walter Charlton (Three anatomic lectures etc., 1683); Samuel Collins (Systema anatomicum etc., 1685); Thomas Gibson (The anatomy of human bodies epitomized, 1684); James Keill (The anatomy of the human body abridged, 1698), and the writers on special anatomy: Francis Glisson (Anatomia hepatis etc., 1654); Thomas Wharton (1610–1673; Adenographia, 1656); Thomas Willis (1622–1675; Cerebri anatome, 1664); Clopton Havers (Osteologia nova, 1691): Henry Ridley (Anatomy of the brain etc., 1695). H.]

A highly important doctrine and discovery buried, alas, in numerous quartos, but which should be considered in pathology quite equal to that of Harvey in physiology, was brought forward by Conrad Victor Schneider (1614–1680) of Bitterfeld in Saxony, professor in Wittenberg (after 1639), as the result of his extremely careful investigations of the mucous membrane of the nose.

He demonstrated anatomically and clinically that it was not the brain, but this membrane, which secreted the mucus discharged in disease, and by this inductive explanation, which seems to us now so simple and self-evident, overthrew at once and forever the whole doctrine of the Ancients with regard to the numerous catarrhal diseases.

The other departments of anatomy likewise experienced a more refined physiological elaboration, if such an expression may be allowed. On all sides, however, the ideas of the Ancients still clung to their ascendancy, and were never easy to set aside, while now, as in all ages, new errors appeared frequently in place of the old, the result of the doubtful interpretation of new discoveries. Still the overplus of truth continued to be quite considerable. Thus e. g. Willis, who won for himself great credit by his investigation of the nervous system, especially of the brain (he described the ganglia), as well as by his comparative study of the brains of animals, declared that the conduction of the spirits (in the form of a humor supposed to exist in the nerves) belonged to the nerves, (which were considered hollow), but that the secretion of these spirits was a function of the brain, although he understood each special part of the latter (by the way nothing new) to be the seat of a definite function, just as we do to-day. Moreover he greatly advanced our knowledge of the blood-vessels of the brain (a subject also enriched by Wepfer), and regarded the sinuses as veins, while Sylvius, on the contrary, whose name continues associated with several parts of the brain even to the present day, considered them direct anastomoses with the arteries. Diemerbroeck still looked upon the brain as an organ for the secretion of mucus, just as the Ancients did, but Malpighi, who studied the cortical matter with especial thoroughness (even with the microscope), interpreting the ganglia erroneously, declared it to be glandular in its character. Hence he considered it specially adapted to the secretion of the "vital spirits, spirits and nervous spirits" — of that neither purely fluid, nor yet simply volatile, principle of life, concerning the actual existence of which, after this discovery (or false observation) of Malpighi, no further doubt ever made its appearance. Blaes erroneously derived the nerves from the dura mater, but enriched our knowledge of the spinal cord with some correct observations. Swammerdam described more completely the arachnoid of the brain, while Leeuwenhoeck, on the other hand, who made use of the aid of the microscope, taught the recognition of the great vascularity of the cortical matter — the Ancients from the time of Aristotle had considered the brain non-vascular — and, misinterpreting the varicosities of the nerves, believed the medullary substance to be composed of innumerable globules. The best and most complete description of the central, and in part also of the peripheral, nervous system, was furnished by Vieussens. Gottfried Bidloo (1649–1713), a physician of Amsterdam, composed some bad text for the highly praised plates of the artist Gerard de Lairesse. The latter, as already remarked, were made use of by Cowper, who did not sufficiently indicate their source. Glisson claimed to have observed that the nervous fluid, now generally accepted in the nerves (which latter were considered hollow, and connected with the brain or its cavities), had an actual existence, while Wharton thought the nerves and glands connected with each other, and even reckoned the glands among the nerves. Henry Ridley (at the close of the century) and others assigned nerves, as well as muscles, to the dura mater, and Baglivi at once utilized these supposed muscles to explain the movements of the brain, while Pacchioni considered the dura mater a kind of heart for the vital spirits. In this conclusion Lancisi, a pupil of Riva (1627–1677) of Asti, agreed, and he even assigned muscles to the ganglia. It was believed that by the motions of the brain the nervous fluid or vital spirits was driven into the hollow nerves, and that sensation etc. was produced by contraction and relaxation, like muscular movement. This doctrine of the movement of the nerves was first overthrown by Haller. After these investigations, the results of which were rashly assumed to be unquestionable, the doctrine of the vital spirits continually acquired greater prevalence, and finally ruled pathology with absolute sway. Franc. Giuseppe Borri of Milan, who has been already mentioned, analyzed the substance of the brain (1669), and found in it 25 per cent. of fat. How carefully and thoroughly they went to work at these investigations on the structure of the parts of the body is evident from the fact that François Pourfour du Petit (1664–1741), who belongs chiefly to the 18th century, asserted that in the brain and spinal cord the nervous fibres decussate freely. Petit also in 1727 was the first to divide the cervical sympathetic nerve for purposes of experiment. Helmont was the first to remark that the peripheral motor nerves were also sensitive to pain.

In the investigations of the organs of sense also, and of the physico-physiological conditions of perception by means of these organs, the same care is everywhere manifested. Thus the most important discoveries relative to the structure and function of the eye were made at this period. Ruysch (tunica Ruyschiana, the ciliary nerves, the venæ vorticosæ) and Leeuwenhoeck (the lens) enriched our knowledge of the former, and, in respect to its function, the fundamental laws of sight were then established for all time. The great physician and astronomer Joh. Kepler (1571–1630), of Weil in Würtemberg, who found consolation in poetry for his material distress, taught in 1604 the recognition of the function of the lens as a part of the optic system of the eye, and thus overturned the entire doctrine of the Ancients which had heretofore prevailed, that sight took place by means of the lens. He also explained the cause of short and far-sightedness, the function of the retina[1] etc.; the Jesuit Christoph Scheiner in Vienna (died 1650) demonstrated the image upon the retina, studied the motions of the pupil and the changes of curvature of the lens in accommodation etc.; Descartes compared the eye to a camera obscura, explained how objects were seen erect and single. Edm. Mariotte (died 1684; he brought forward the so-called "Mariotte's law" in 1676), prior, and a member of the Académie at Paris, on the other hand erroneously located vision in the choroid membrane (Peiresc had assigned it to the vitreous body) and demonstrated the blind spot. He was also the first to demonstrate experimentally that the so-called "Augenleuchten" (shining of the eye) depended upon reflection. Hartsoeker sought the explanation of upright vision in the complementary function of touch; Perrault and Pecquet interested themselves in the discussion of the place of vision, while Plempius pointed out the nutrition of the lens by its capsule. Giov. Bapt. Verla published at Florence in 1677 an "Anatomia artifiziale dell' occhio umano", which was translated into Latin and appeared at Amsterdam in 1680 as "Anatomia artificialis oculi humani cum 7 tabulis." The anatomy of the ear as a whole was considerably advanced by Vieussens, Duverney especially (he discovered the ciliary ganglion), and Schellhammer; that of its parts, by Joh. Heinrich Glaser (1629–1675), professor in Basel, Sylvius (process of the malleus), Folli, Paolo Manfredi, professor in Rome, Perrault (muscles of the internal ear, and the lamina spiralis as the special organ of hearing), Mery (who regarded the nervous layers as specially designed for hearing) and others.

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[1] According to Magnus, Heliodorus of Larissa (about A. D. 100), without any knowledge of the retina, taught the existence of central and peripheral vision and the direction of the axis of the eye.

The physiological doctrines of respiration and digestion, of secretion and nutrition, motion etc., as they prevailed in the seventeenth century, are laid down in the medical systems already exhibited, of which they formed the foundation.

John Mayow (1645–1679) explained the process of respiration as follows: "Respiration consists in the separation from the air by the lungs, and the intermixture with the blood-mass, of certain particles absolutely necessary to animal life, and the loss by the inspired air of some of its elasticity. *The particles of the air absorbed during respiration are designed to convert the black or venous blood into the red or arterial.*" (See Daremberg, tom. II, p. 704). Mayow also declared the placenta to be the lungs of the fœtus, and knew that the 3rd nerve contracted the pupil.

The knowledge of the world of the infinitesimal, microscopic anatomy, is a creation of the 17th century. It was founded by the self-taught Leeuwenhoeck (infusoria, torula cerevisiæ and, according to Cohn, the first bacteria — leptothrix in the buccal mucus — in 1683), Malpighi (blood-corpuscles, capillaries rete Malpighii etc.), Hammen (spermatozoa), Robert Hooke (the cells of plants, 1667), Ruysch, Cowper, Havers, etc., and at once took on a vigorous growth. In the 18th century, however, it declined, until once more revived and extended in our own age.

Pathological anatomy enjoyed a rich increase of material, as well from accidental discoveries in the dissections, now so frequent, as from intentional investigations of the anatomical changes occasioned by disease. Even Harvey declared that the dissection of a single phthisical patient was of more advantage to medicine than that of ten executed criminals.

Besides the publication of observations confirmed by the autopsy, to which we have already referred, other similar reports were made by many other physicians, as e. g. by Joh. Rudolph Salzmann, professor in Strassburg, Joh. Dan. Horst, Nic. Pechlin (1646–1714), Timäus von Güldenklee, ordinary physician to the Great Elector, Peyer, Harder, Felix Platter, Thom. Bartholin, J. Nic. Binninger (born 1628), Joh. Daniel Hofmann in Altdorf, Phil. Salmuth (died 1626), ordinary physician of the Prince of Anhalt-Köthen, Nic. Tulpius (1593–1674; he first observed pulsation of the spleen) in Amsterdam, whom Rembrandt van Ryn (1606–1669) immortalized, together with the members of the guild of surgeons of which Tulpius was president, in his famous "Anatomy"; Ruysch, Peter Paaw (1564–1617), Stalpaart van der Wyl, Franc. Bertoletti (1588–1630), Severino, Spieghel, Bellini and many others.

Besides the compendium of pathological anatomy by Welsch, who has been already mentioned, and who must be regarded as the founder of that science, other larger compilations upon this subject were written. One, particularly well known, was the work of Theoph. Bonet (1620–1689; "Sepulchretum anatomicum, seu anatome practica ex cadaveribus morbo denatis" etc., Geneva, 1679) of Geneva, ordinary physician of the Prince of Neufchatel. Another, more extensive, but less important, had for its author Juan Pablo (born 1620), who also published a work on the instruction of deaf-mutes. Other works on pathological anatomy were written by Just. Schrader (1674) and Stephen Blankaart (1688).

4. STATE-MEDICINE. PSYCHIATRY. HISTORY OF MEDICINE.

State-medicine in the seventeenth century already enjoyed much attention on the part of the physicians of almost all the civilized states of the period. It was cultivated partly in special works devoted to this subject, partly incidentally in other studies. It too derived advantage from the lively interest in anatomy which at that time everywhere prevailed; indeed judicial autopsies came into vogue. Paolo Zacchias[1] (1584–1659), ordinary physician to the Pope, wrote an independent work, famous for its medical information and especially for the legal knowledge recorded therein, though of course not free from the superstitious views regarding magic etc., which were at this time so widely diffused. It gives, however, some opinions concerning wounds of the eyes. Zacchias may be looked upon as the founder of legal medicine.

In France N. Blegny (1684), Gendrie d'Angers (1650) and others devoted attention to subjects connected with state-medicine. Still the physicians of this country did not in general busy themselves much with this department. In 1679, however, in consequence of the large number of suits at law relating to poisoning and infanticide in the highest classes, all such suits were quashed, (Poudre de succession de la Vigouroux and the burning of 2500 children by la Voisin).[2]

This department, however, received its most active cultivation at the hands of the Germans. Ludwig von Hoernigk (1600–1667), who may be looked upon as the type of a savant of the 17th century,[3] wrote in 1638 a work on the duties of the medical profession as a whole. The famous Paul

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[1] Haeser calls him Zacchia. His "Quæstiones medico-legales" etc. appeared at Rome in 1621. The "De relationibus medicorum" etc. of Fortunatus Fidelis, a professor in Palermo, appeared in 1602. (H.)

[2] In 1637 the Royal College of Physicians of London presented to the Council a "Report on all such annoyances as they conceive likely to increase the sickness in this populous city". — 1. The increase of buildings, by which multitudes are drawn hither to inhabit. 2. Inmates by whom houses are so pestered that they become unwholesome. 3. Neglect of cleansing the common sewers and town ditches, and permitting standing ponds in inns. 4. The uncleanness of the streets. 5. Laystalls so near the city, especially on the north side. 6. Slaughterhouses. 7. Burying of infected persons in churches and churchyards in the city. Overlaying the churches with burials, so that many times they take up bodies to make way for more burials. 8. Carrying up funnels to the tops of the houses from privies and vaults. 9. Selling musty corn, and baking bread thereof, and brewers using unsound malt. 10. Butchers selling unsound cattle. 11. Tainted fish. They suggest the formation of a Commission or Office of Health, which has been found useful in Spain, Italy and elsewhere (Richards). I find no evidence that this report was ever acted upon by the Council. (H.)

[3] Hoernigk was the descendant of a family of Darmstadt, but was born in Frankfort-on-the-Main and died in Mayence. He was a Doctor of law, medicine and philosophy.

Ammann (1634–1691), professor in Leipzig, and Hieronymus Welsch published works on the mortality of wounds; Melchior Sebiz (1641) wrote on the same subject and on the signs of virginity. Joh. Friedr. Zittmann, who was devoted to the belief in demons and witches; Bernhard Suevus and Joh. Bohn, the scientific founder of state-medicine in Germany, wrote also on these subjects. The latter, like Conr. Berth. Behrens (1660–1736), ordinary physician to the court of Brunswick, also wrote on the duties of the forensic physician (Gerichtsarzt). The same subject engaged the attention of J. N. Pfeizer (Nuremberg, 1668). The Hollander Feltmann expatiated on the examination of corpses, and John Brown (born 1642) on the mortality of wounds.

A new fact discovered by Swammerdam in 1667 — the floating of the lungs after respiration has once taken place — was at once recommended to medico-legal application by Malachias Thruston and especially by Carl Rayger. The conditions limiting the extent of its application were next supplied by Ph. Jac. Hartmann; but the discovery was first practically recognized in 1681 by Joh. Schreyer, a physician of Zeitz. A peasant maid of about fifteen years of age was accused of infanticide The lungs of the infant, however, sunk, and Schreyer and Thomasius thus effected her acquittal.

The pathway of medical statistics was also opened at this period by the Englishman John Graunt[1] in 1662. [and Charles Clermont (Claramontius), a physician of Wales, with his work "De aëre, locis et aquis terræ Angliæ" etc. (London, 1672), furnished the earliest medical topography of England. H.]

Numerous ordinances of medical-police, i. e. hygienic ordinances, appeared in the 17th century, which may be called the natal era of state-police. These included plague-ordinances, ordinances relative to clothing and food, the inspection of provisions etc. etc.

Psychiatry, as such, was not yet treated in its entirety or separately, though occasionally a few facts relating to this subject received attention. In this connexion Sydenham, Highmore, Baglivi, Helmont and above all Willis (we owe to him our first information of dementia paralytica) must be mentioned. The latter referred mental disorders to disease of the brain.

On the other hand, subjects relating to the history of ancient medicine were frequently handled, e. g. by Ph. J. Hartmann (anatomy of the Ancients) Mich. Döring, Helmont, Gottfr. Mobius (1611–1664), Joh. Neander (born 1596). The following physicians belong for the most part to the seventeenth century: Bernhard Albinus (1653–1721), an historical investigator, father of the famous anatomist; Salomon Cellarius (1676–1700), author of the "Origines et antiquitates medicinæ"; Joh. Conrad Barchusen (1666–1723), "Historia medicinæ" etc. Daniel Le Clerc (Clericus; 1652–1728), who wrote in 1696 an important and comprehensive work on the history of medicine, based upon a study of the original authorities, extending from the creation down to Galen,[1] and distinguished by its erudition, simplicity and completeness. [Baldwin Hamey (1600–1676), an eminent member and benefactor of the College of Physicians of London, left some manuscript memoirs of the famous physicians of his day, with a treatise "On the oath of Hippocrates", published posthumously by Littleton in 1688. H.]

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[1] "Natural and political observations upon the bills of mortality", London, 1662. Graunt shows that in London one-third of the infants perish before attaining the age of three years; the mortality among puerperal women was one in two hundred; the mortality in the city was about 8 per cent. greater than in the country; twice as many women suffered from sickness as men etc. (H.)

5. VETERINARY MEDICINE. PHARMACOLOGY AND PHARMACY.

Although a few regular physicians, like Ramazzini, occupied themselves with the comparative study of the diseases of animals — e. g. with the epidemic cattle-plague (Rinderpest) — yet the cultivation of veterinary medicine, on the whole, still remained in the hands of persons of little education. Yet this science too made some advance in the seventeenth century, particularly as regards a more general diffusion.

In the first place there appeared in 1607 a French translation of the treatise of Ruini, under the direction of his nephew Horatio Francini. This was followed by Beaugrand (Maréchal expert, The experienced farrier, 1619) and "La connaisance des chevaux" (1646) by de Bouvray, together with a work by de la Bussinière (1660), who made use of numerous chemical remedies, including the lapis divinus. Jacques de Solleysel (1664), who for a long time was regarded as an international authority in the department of veterinary medicine, is distinguished by his study of the Ancients and his relative independence in observation, as well as by his superstition, polypharmacy and lack of anatomical knowledge. — A work entitled "The Anatomy of an Horse" — other branches of animal anatomy made very little advance in this century — was written by Andrew Snape of London in 1686. The first German work on veterinary medicine, which the author followed with several others containing pictures of monsters, coitus etc., was published by G. S. Winter von Adlersflügel in 1668, and bore the title of "Bellerophon".

On the other hand, important contributions to pharmacology were made in the seventeenth century, both in chemical remedies and preparations[2] and in those derived from the vegetable kingdom. To enumerate the former, however, would be to write the history of chemistry, and we therefore content ourselves with mentioning only a few of them. Many new alkalis and acids especially were introduced by the Iatro-chemists.

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[1] He also discusses medical history cursorily down to Theophrastus von Hohenheim, whom, however, he criticises entirely erroneously.

[2] As these were antigalenical, the Faculty almost everywhere opposed them and demanded their abjuration in the doctor's oath.

and for a long time lime-water was employed as a remedy (and even a secret nostrum) for calculus, a disease which seems still to have been very common. Tartar emetic was recommended by Mynsicht, the sel de Seignette, by the apothecary Seignette of Rochelle in 1672, and the oxide of zinc and Glauber's salt were popularized by Glauber. The internal use of mercury, arsenic and many other metallic remedies was considerably extended. — In opposition to the earlier and generally dangerous mineral emetics, ipecacuanha[1] (Ruhrwurzel), introduced by the physician le Gras in 1672, speedily attained great reputation, though originally employed solely as a remedy for dysentery. In the form of a nostrum it was even sold to the French government by Joh. Friedrich Helvetius in 1686 for the sum of 1000 louis d' or. The use of arnica, an herb already known, was extended by Joh. Mich. Fehr (1610–1688) of Schweinfurt, as well as that of opium, digitalis and lichen Islandicus (Ole Borch). Finally Wepfer, in conjunction with Brunner and Harder, instituted experimental studies regarding the action of drugs upon animals. The latter were vivisected and dissected in order to determine the phenomena and effects of the drugs during life and after death. — The whole medical world, however, was divided at that time, and even down into the eighteenth century, into two sharply opposed parties by the Cinchona bark, which was introduced into Europe in 1640 by Juan del Vego, ordinary physician to the Count of Cinchon, and christened "Cinchona or Countess's bark", in honor of the wife of the Count, who had been cured by it. The motives influencing the struggle of its opponents were borrowed in part from the doctrine of qualities of the Ancients, partly from hatred of the Jesuits (who took special pains to extend the use of the bark, simply because there was money in the business) and partly from avarice, because it cured so speedily as to render the existence of physicians precarious. On the side of its supporters[2] the verdict of simple experience, doubtless often too much influenced by enthusiasm, was chiefly relied upon. Sydenham deserves the greatest credit for the introduction of the bark into England, while Robert Tabor[3] sold it in France only as a nostrum. In Germany Peyer and Mich.

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1. It was first described by Guillaume Le Pois in his "De medicina Brasiliensi". 1648. (H.)
2. The earliest medical work to recommend the use of the cinchona bark was the "Vera praxis ad curationem tertianæ" etc. of Pietro Barba, a professor in Valladolid, which appeared at Seville in 1642. Shortly after its first introduction into Europe the "pulvis comitissæ" was sold literally for its weight in gold. Sturmius in 1658 says that he saw twenty doses of the powder sold at Brussels for sixty florins, and as late as 1680 a pound of the bark cost in London £8. (H.)
3. Tabor was an apothecary of Cambridge, who prepared a secret preparation of the bark, said to consist of cinchona, lemon juice or Rhine wine and a little opium. He settled in London in 1671 and published in 1672 his "Pyretologia, or a rational account of the cause and cure of agues, with their signs". He went to Paris in 1679, and was so successful in curing the Dauphin and many other patients that the government purchased his secret for the sum of 2000 louisd'or. (H.)

Bernhard Valentini (1657–1729) of Giessen, professor in the university of that city, are said to have been the first to employ it.

We must not omit to mention that in the seventeenth century several historically important articles of luxury and food were introduced. Tobacco,[1] already known in the preceding century (1560), gained a more general diffusion; potatoes, tea, coffee[2] and chocolate were also introduced, and immediately used with avidity and genuine enthusiasm. Yet some ascribe to the consumption of the latter delicacies the peculiarly nervous constitution of our modern times and the nervous character of our diseases,[3] and to the potato, the wider diffusion of scrofula. In fact Moleschott ascribes to the latter the stupidity of certain peoples. It seems more probable, however, that our "nervousness" is to be charged rather to the account of too fast living and too hasty a pursuit of gain and pleasure.

Quite as important, however, as the introduction of new remedies was the origin of an effort to remove from the pharmacies the old rubbish (for armor it cannot be called), which Daniel Ludwig strove to discard. In this category we may include the obsolete Water of Chastity, Frog-spawn-water, Female Cordial, Three-headed Cerberus, menstrual blood, mole's blood, Oil of Spiders, snake's tongue, mouse-dung, Spirits of Human Brain, urine of a new-born child etc., etc.[4]

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[1] Adolph Occo (1524–1604), city-physician of Augsburg, and author of a pharmacopœia, received the first tobacco leaves from France in 1565, and their identity was established by Gesner. The 17th century, the age *par excellence* of restrictive legislation, interdicted at once the "stinking tobacco-drinking", as smoking was then called. In 1624 the pope threatened snuff-takers with the ban, while the Turks, on the other hand, simply threatened to stick the pipes of smokers into their noses, though in 1633 the penalty was increased to death. The emperor of Russia surpassed even the Turks, for he had the noses of "tobacco-drinkers and tobacco-swillers" slit up, punished them with the knout and banished them to Siberia. Fines were often imposed, as e. g. in Wimpfen, where the penalty for smoking was one florin.

[2] The first coffee-house was established in Constantinople in 1554. They were introduced into Italy in 1645, London 1652, Marseilles 1671, Vienna 1683, Hamburg 1686 and Stuttgart 1712. Originally one pound of coffee cost 112 marks = $28.

The coffee-houses in England became such resorts for political meetings and gossip that they were temporarily closed by Charles II. in 1675. (H.)

[3] Others, e. g. Henne-am-Rhyn, date from the general use of these articles the abandonment of the mediæval custom of eating and drinking in large quantity, and the substitution of fastidiousness in eating and drinking, which began in the 18th century.

[4] What was old even in the seventeenth century (in spite of the fact that part of it has been in later times again brought forward as new), and what unprejudiced heads there were even then in Germany, may be judged from the following views of Ludwig: "A universal remedy does not exist: specifics are never trustworthy. Cinnamon is effective in menstrual hæmorrhages. No one should without necessity remain in the dwellings of patients suffering from dysentery, especially in the place where the discharges are placed. The latter should be taken to remote places and covered with lime or ashes. The beds, linen and clothing used by such patients should all be carefully washed. Before the dwellings in which such patients have been living are again occupied, we should not neglect to fumigate and clean them thoroughly.—He only is the judicious physician who aids Nature, the Healer of diseases, when she shows herself too feeble, but does not disturb or hinder her in her efforts by a daily mass of drugs. The physician should not only cure safely, speedily and pleasantly, but also with few and cheap drugs." This last humane demand is too little respected even at the present day.

The use of mineral waters and baths began in the 17th century to be studied in accordance with the chemical system. The alkalinity or acidity of the mineral waters was mentioned, and they were accordingly prescribed in the treatment of suitable cases. In comparison with the fantastic theories and the deception of the 16th century (much of which continues to exist in this department even at the present day), the indications for the use of mineral waters thus acquired increased definiteness — which they needed — although at first they made no great gain in rationality. The prescription of physicians regarding their employment was rarely asked. The arrangements for bathing too were very primitive, even as regards the shelter of the guests, who not infrequently lived in tents. The easy accessibility of the latter favored immoral practices between the sexes, particularly as many trips to the baths were undertaken at this period for purposes of immorality. Gambling too was extremely popular, e. g. in Schwalbach, and even in that day cases were not wanting where guests, ruined by their losses at play, committed suicide.

[In England too the study of the various domestic mineral waters received much attention. As early as 1572 John Jones, a Welsh physician, wrote a treatise on "The benefit of the ancient bathes of Buckstone" (Buxton). He was followed by Edmund Deane (1626, Knaresborough), Edward Jorden (1631), Thomas Guidott (De thermis Brittanicis, 1681), Martin Lister (De fontibus medicatis Angliæ, 1682), Sir Patrick Dun (On the analysis of mineral waters, 1683), Robert Wittie (died 1684, Scarborough), Samuel Durham (Ilmington, 1685), John Maplet (Bath, 1694), Charles Leigh (Exercitationes quinque de aquis mineralibus, 1697), author also of a history of Virginia (1705), Sir John Floyer (An inquiry into the right use of the hot, cold and temperate baths in England, 1697), Nehemiah Grew (Epsom, 1698) and others. (H.)]

Pharmacy of course must have profited by the introduction of important drugs, and still more by the equally wide-spread and scientific study of chemistry. Hence a number of the most absurd and polypharmacal compounds and plasters disappeared, at least among the better class of physicians, and simpler forms of medicines (so far as one can speak of simplicity in prescriptions which were still very complex) were introduced in their place. In proportion to the general interest in the chemical preparation of medicines was the number of new, or newly revised, pharmacopœias. The authors of these were chiefly physicians and chemists, or simple apothecaries. Thus, besides numerous city pharmacopœias, there also appeared others by Andr. Libavius (1606), Jean de Renou (1615), Minderer (1621) "Medicina Militaris", Mynsicht (1631), Poterie (1622),

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Often the large bills of the apothecary occasion for the patients the want of articles most necessary for their comfort, a want which the physician might have obviated and which not infrequently injures most the poor children, who are thus deprived of those comforts which the expensive apothecary has consumed. (See Marx.)

the first London Pharmacopœia (1618)[1], first of Paris (1639). Other pharmacopœias were published by Dan. Ludwig[2] (1625–1680, Ludovicus Ludovici) of Weimar, ordinary physician to the duke of Gotha, the "immortal reformer of the Materia Medica", of whom Stahl said "that he was the first who ventured to speak boldly concerning the Materia Medica, and who sought in an incomparable way to purify the Augean stable"; Johann Zwelfer (1652, "Augsburg Pharmacopœia"); J. Schröder (1600–1664), a physician of Frankfort-on-the-Main, whose pharmacopœia (1641) continued popular for more than a century; a Universal Pharmacopœia by Joh. Helfrich Jüngken (1677); Nic. Lémery (1697); Christian Franz Paulini (1643–1712) of Eisenach, a peripatetic physician, poet and historian, best known by his "heilsame Dreckapotheke, wie nemlich mit Koth und Urin fast alle, ja auch die schwerste giftigste Krankheiten und bezauberten Schäden, vom Haupte bis zu'n Füssen, innerlich und äusserlich glücklich curirt werden" etc.

In this work, which is of considerable importance for our knowledge of popular medicine and superstition, it is stated that the quintessence of all the food is contained in the fæces, hence their efficacy. The dung of screech-owls was recommended against melancholy; likewise the dung of doves and calves boiled in wine, ox-dung etc. For gout, dog-dung and fleas boiled with sage were prescribed, while the death-sweat was recommended for warts. Poor humanity, what hast thou not taken and had recommended as remedies for death and disease! Scourging too (see J. H. Meibom and others) and prayer, music (Fried. Erhardt Niedten, 1717), the breath of young maidens (J. H. Cohausen, 1753), all have been regarded as means for prolonging life!

That the number of pharmacies, however, must have been greatly on the increase in the seventeenth century, so that no city of any note was without at least one, would follow from the number of published pharmacopœias, even if the fact were not established by other evidence.

6. EPIDEMIC DISEASES.

The seventeenth century yields to no period of the Middle Ages in the extent ,number, mortality, diversity and malignity of its epidemics. By these, and the incessant wars closely connected therewith, there was occasioned a loss of human life, only equalled in individual countries in the following century, indeed not completely rivalled until our own.

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[1] The pharmacopœia of Brice Bauderon (1588) of Macon was translated from the French into Latin by Philemon Holland, and published in London in 1639. William Salmon also published "The new London Dispensatory" in 1678 and the "Seplasium, or complete English physician, or the druggist's shop opened", London, 1693. A "Pharmacopœa Bateana" was also published in 16-8 by J. Skipton, an apothecary of London, who compiled it from the prescriptions of Dr. William Bate (1608–1669), ordinary physician of Charles I., Cromwell and Charles II. To the second edition of the "Pharmacopœa Bateana" (1691) was appended the "Arcana Goddardiana" of Dr. Jonathan Goddard (1617–1674). Dr. Walter Harris also published a "Pharmacopœa anti-empirica" etc. in 1683. (H.)

[2] He was the first "Gallisirer" or "Wine-doctorer", inasmuch as he pointed out "that a poor must, by the addition of sugar before fermentation, affords a strong wine".

Above all other epidemics, the plague, although in this century[1] it lost its predominance in Europe, was in many places still destructive. Thus it raged in England, especially in London, 1603–1608, in Ireland in 1650, and again for the last time in London in 1665, in the form of a terrible epidemic, which swept off 69,000 human beings. This epidemic, as well as the great fire of the following year, was ascribed to the Jesuits, and four of them were accordingly executed. (Grün.) — In Germany it prevailed in Silesia in 1656, and in a large part of the same province in the following year. It then in 1666 revisited the countries bordering on the Rhine, appeared in Vienna in 1679 (70,000 victims), in Prague 1681 (83,000 victims), then in Thuringia, Saxony, and Middle Germany in general in 1682, ever a dismal destroyer of human life. In Magdeburg alone there died in six months 4500 people, in Halle, nearly half its population.—Spain between 1677 and 1681 was ravaged for the last time severely; France was visited in the years 1608, 1634 and 1668; Italy in 1630,[2] 1656, 1669, 1683 and 1691; Switzerland in 1667 and 1668; in the north, Denmark in 1654 and Sweden in 1657 experienced the ravages of the disease. The damp Netherlands were often ravaged by the plague, as in 1625, 1631, 1667, 1669, and for the last times in 1677 and 1680.

The regulations adopted by the state and by communities against the introduction and spread of the plague were not rarely as comprehensive and judicious, as they were (many of them at least) expressions of Draconian authority. On the outbreak of the disease in remote places these regulations were at once put in force as a measure of precaution. Thus e. g. in Magdeburg in the year 1680 a physician, surgeon, minister, nurses, 24 inspectors of the streets, 24 corpse-bearers and 12 grave-diggers for the plague were appointed by the magistrates in anticipation of its appearance, and a plague-hospital was erected. The house in which the first case of plague appeared was burned down — at all events a more effective means of disinfection than most of ours of the present day!

Outbreaks of typhus fever occurred along with, and between, the epidemics of the plague, especially during the Thirty Years' War, a period which, as may be inferred from the statements already made, remained almost free from the genuine plague. Typhous epidemics swept off an enormous number of human beings, particularly among the peoples ravaged by the wars of this sad period, and these epidemics often extended over entire countries. They are mentioned under the various designations of "spotted fever, war fever, camp fever, the plague, the pestilence of Mansfeld, purpura" etc.

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[1] From the time of Augustus down to the year 1680 the plague had appeared 79 times as a general epidemic.

[2] In Florence 12,000 died, in Mantua 25,000, in Bologna 30,000, in Milan 180,000. In the latter city occurred the notorious trial of the barber Mord and the health commissioner Piazza, who were said to have rubbed "Plague-salve" upon the house-walls, and who, after all kinds of tortures, had their hands cut off, were broken on the wheel and then burned. And this only 256 years ago!

Essentially related to the preceding disease, there also occurred, between, and along with, the epidemics of typhus, other epidemics of typhoid pneumonia, which did not appear everywhere, but in perfectly distinct groups of cases and in certain countries only. Such epidemics appeared in Italy in the years 1602 (in Verona, Urbino and Gualda), 1633 (throughout upper Italy) and 1696 (in Ferrara); in Switzerland, another favorite resort, in 1652 (Glarus), 1685 (on lake Geneva) and 1694–95 in more general diffusion. Twice during this century these epidemics showed themselves in Germany, at Augsburg in 1624 and in 1689 in the Breisgau. The period of their prevalence was during the months of Spring, which (with the early Winter) still continues the most favorable season for the appearance of the ordinary semi-annual, miasmatic pneumonias.

Malarial diseases also in the seventeenth century (as well as in the sixteenth, e. g. 1559–1563) frequently assumed a malignant and pandemic character. This was the case especially in the second half of the century, in the years 1657–1669 and 1677–1685, which latter pandemic just preceded an epidemic of the plague. These malarial diseases raged most fiercely in England[1] and the Netherlands, though not always accompanied by a heavy mortality, and they usually stamped with an intermittent character other concurrent diseases. Toward the close of the century they again appeared in a pandemic form, and were especially severe in Italy from 1690 to 1695. Lancisi, like Varro long before him, assumed minute animals in the air of marshes to be the cause of these diseases (Loeffler).

During the Thirty Years' War epidemics of dysentery, of greater or less extent, prevailed in different countries. The most extensive of these appeared in 1623–25 in Germany, the Netherlands and France. After the close of the war, however, they raged still more fiercely. Thus they appeared in Middle Germany in 1666, and again here, as well as in the northern states, from 1676 to 1679. The most important epidemic, however, appeared in England between 1668 and 1672, and was well observed and described by the famous Sydenham and Morton, who on this occasion furnished anew the old evidence that even two famous physicians cannot readily hold the same views relative to the therapeutics of one and the same disease—a fact which has always led to medical disputes, rather than to the advancement of science and the good of the patient, inasmuch as patient, business and the honor of the healing art are often forgotten in these petty quarrels.

Ergotism again appeared within circumscribed limits, as in the Sologne in France 1630, 1650, 1660, 1664, 1670, 1694; in Westphalia, Voigtland and Hesse in 1648–9, 1672, 1675, 1687, 1693 also in the Black Forest, and in 1699 in the Harz; in Switzerland in 1650 and 1674, both times in the same cantons of Berne, Lucerne and Zürich.

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[1] Both king James I. and Oliver Cromwell died of the ague. "At that time the soil about London was neither drained nor cultivated during some months of the year. The marshes of Cambridgeshire and Lincolnshire were covered with clouds of cranes. Southwark was a swamp, and at Westminister there is a gate called the Marshgate, from being situated in a place where there was once a marsh. Ague was less prevalent after the Great Fire. . . . According to Sydenham, from 1661 to 1665 it was the most fatal disease in England." (R. L. McDonnell.) (H.)

Epidemics of influenza likewise prevailed in Germany in 1658 and 1675, in Italy 1626–27, in Holland 1643 and in America 1647, 1655, and still more generally diffused in 1675 and 1693.

Epidemics of hooping-cough were described by Willis, Sydenham (1570) and Ettmüller (1685).

Diphtheria (Garotillo) showed itself in Spain and Italy only[1]; in the former country from 1600 to 1618, with only brief interruptions, then in 1630, 1650 and 1666. In Italy it appeared for the first time in 1610, then from 1618 to 1630; in 1620 and the following years to 1630, upon the islands also, and in 1650 again on the mainland. The new epidemic was described by a large number of writers, including Franc. Nola, Giov. Ant. Foglia, Marc. Aur. Severino, and among the Spanish physicians Juan de Villareal, Franc. Perez Casales, Chr. Per. de Herrera, Marc. Ant. Alaymo, Ildefonso Nunnez, as well as by Thomas Bartholin (the Neapolitan epidemic, 1622) and others.

The scarlet fever, which has recently occurred with ever increasing frequency in combination with the last mentioned disease, and which has been most fatally influenced thereby so far as regards its mortality, also appeared at about the same period in Europe for the first time. At least at this period it was first distinctly differentiated from the other acute skin-diseases of childhood. It was first described by Mich. Doering, who observed sporadic cases of the disease in Warsaw and Breslau in 1625, and an epidemic in 1627, and by his father-in-law Dan. Sennert, who observed it at almost the same time (1619) in Wittenberg. In the later years of the seventeenth century it appeared with considerable frequency (in 1642 at Brieg in Silesia, 1652 in Schweinfurt, in England for the first time in 1661, in Thorn in 1665), though always in small and circumscribed epidemics only.

The purples (miliary fever), rötheln and measles were at this period frequently confounded. The first was earliest (1652) mentioned as an affection especially of lying-in women by Joh. Hoppe (1616–1653), professor in Leipzig, Welsch (1655) and by Joh. Christian Lange[2] (1655–1701) also a professor in Leipzig, though the disease speedily won a foot-hold in southern Germany also. Welsch and Sigm. Rupr. Sulzberger already distinguished between a red and a white purples (Friesel). Rötheln, as a milder form of measles, was frequently observed, like measles itself, but the two were never distinguished from each other. The latter diseases were naturalized everywhere in the seventeenth century, though they reached remote Iceland for the first time in 1664, and again in 1694.

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[1] According to Jacobi, diphtheria appeared in New England as early as 1659, in which year Samuel Danforth, of Roxbury, Mass., lost four children in a fortnight by the "malady of bladders in the windpipe." An epidemic also prevailed in Maine about 1671. (H.)

[2] Lange, with Athanasius Kircher and others, was a defender of the origin of animals from putrefaction and the pathologia animata of the 17th century, to which the discovery of the animalcula — infusoria — gave as great an impulse as that of the new microscopic fungi has given to the similar tendency of our own age.

The small-pox, in like manner, often appeared epidemically. It became widely diffused in 1614, and prevailed with some interruptions in England between 1666 and 1675. It raged also in many countries and even in America in the last year but one of the century.

The improved observation of this epoch gave greater prominence also to another infectious disease, puerperal fever. This was, indeed, known to the ancients and the Arabians, and intimations of it were given by Sydenham, Sylvius and even Trincavella and Mercado. It was, however, first separated from other diseases of lying-in women by Willis[1] in 1682, who described it as a special disease under the designation which it still retains. Syphilis had already assumed its forms of the present day. Aug. Hauptmann in 1650 ascribed its origin to small insects, and Lange to microscopic worms. De la Martinière (about 1664) is credited with the earliest knowledge of gonorrhœal rheumatism, and to Christoforo Guarinoni (about 1610) is ascribed the earliest description of cerebral gummata (Proksch).

Finally the scurvy was observed several times in besieged cities, e. g. at Breda in Holland in 1625, at Nuremberg in 1631, in Augsburg in 1632, in the train of the Thirty Years' War, an epoch which, as we have already observed, was in other respects rather unproductive in an epidemiological point of view.

7. CONDITION OF THE MEDICAL PROFESSION.

When we consider the situation of the medical profession in the Middle Ages, we find it characterized, among other things, by the disappearance for a long period of all official positions and of all state authority. After the thirteenth century this was, indeed, gradually changed. The change, however, did not become general and plainly manifest until the seventeenth century, the century of governmental science, i. e. of absolutism and police regulation. At this period most of the higher physicians assumed either fixed offices or positions guaranteed by the state, and in the great majority of cases were settled in permanent residences, which was not the case with the mass of physicians even in the sixteenth century. Through the influence of this change the reputation of the entire profession began to improve, an evidence that judicious pro-

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2. Willis divided "Febres Puerperarum" into "Febris lactea", "Febris putrida", and "Febris symptomatica". (H.)

tection by the state, without petty guardianship, is adapted to elevate, while unlimited license and so-called freedom of practice, as it prevailed in the Middle Ages, can only injure its credit, especially as unregulated competition lends support to those natural vices of the profession — jealousy, thirst for money and fame and the lack of colleagueship.

The clerical element too, after this century, disappeared almost entirely from the ranks of the public physicians, or at most dabbled actively in certain surgical specialties and among the lower classes, as it does indeed to-day. After the Thirty Years' War the clerical profession lost its supremacy, and its place, even in literary matters, was taken by the nobility.[1] The higher elements of the profession were becoming also more numerous, while the lower were better divided and organized, although beside them both we still find a superabundance of quacks and adventurers. Moreover complete freedom of intercourse prevailed almost everywhere, not only between different states of the same language, but also as regards foreign countries.

A special characteristic of the physicians of the seventeenth century, in addition to their unmistakable and general zeal for science, is found in their frequent and intimate occupation with chemistry, mathematics and natural philosophy. In these branches, which were regarded entirely as children (not as yet entirely emancipated, nor of full age) of their mother Medicine, and by no means as the mistresses of that science (the popular idea at the present day), physicians formed the masters and instructors. Yet the seventeenth century was also the special age of medical alchemists and of impecuniosity, the latter a curse which even the best men strove to relieve by the methods of alchemy!

What the medical profession was, and how numerous and mixed it still was, may be judged simply from the following catalogue which adorns the title of a compendium of state-medicine. Thus even the titles of books of this period, although not designed to attract attention by excessive oddity or wit, may claim some value in the history of culture. Such a title becomes the shortest possible epitome of the relations and organization of the medical profession in the seventeenth century. One of these works enumerates the following practitioners of medicine:

1. The Medical Profession proper.

a. Medici in general, commissioned court, field, hospital and plague medici;

b. Surgeons, barbers, regimental surgeons (Feldscheerer), oculists, herniotomists, lithotomists, bath-keepers.

c. Superior sworn midwives, ordinary midwives, inferior midwives, nurses.

d. Apothecaries, druggists, confectioners, grocers.

2. Sundry Impostors and pretended Physicians.

Old women, village priests, hermits, quacks, uroscopists, Pseudo-Paracelsists, pyrotechnists (Ofenschwarmer), Jews, calf-doctors (emetic-peddlers), executioners, crystallomancers,[1] mountebanks, vagrants, magicians, exorcists, monsters, wood-hermits (Waldheintzen), rat-catchers, bankrupts, jugglers, gipsies etc. To these must be added Professors and veterinary physicians.

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[1] According to Paulsen, the academies for young noblemen (Ritteracademieen) took their rise at this period, and at the close of the century began the custom of conferring titles and nobility upon savants, a fruitful source of vanity in the universities, maintained even to the present day.

Instruction in the medical branches in the seventeenth century assumed in general a better direction and form. While, however, until the close of the sixteenth century Italy served as the model for educational arrangements, this country now lost its supremacy in medicine, — the influence of Jesuitical tutelage here banished more and more free investigation and liberal tendencies — and was compelled to yield precedence to the Netherlands and to France, whose universities at Leyden, Paris and Montpellier became now the goal of all those who desired to acquire the highest education of the day in this department of science. Most of the German schools, in consequence of the unfortunate war, stood behind the others. It was strictly enjoined upon the professors to follow closely in their teachings the doctrines of the Ancients and the Arabians. Thus the statutes for the professors at Helmstädt e. g. ran as follows: "We desire the medical art, even as it was rightly and wholly fixed and handed down, under the guidance and direction of God, by the inspired artists Hippocrates, Galen and Avicenna, to be preserved and diffused by teaching. We recommend that all Empirics and the "Tetralogies" of Paracelsus, with other corruptions of medicine not agreeable to the doctrines of Galen and Avicenna, be banished entirely from our Academy." (See Marx.) It was not until 1655 that the abjuration of the use of antimony and mercury was expunged from the doctors'-oath at Heidelberg. Theosophy, as well as the Aristotelian or scholastic philosophy, continued in full bloom. Moreover physicians proper (the so-called medici puri) and surgeons were, of course, still carefully separated in their education. Yet the despised and "unlearned" surgeons, almost alone, urged, and struggled for, the association of the two branches. Not a few of them too studied medicine for themselves, although no physicians devoted themselves in earnest to surgery.

With the exception of the universities of the Netherlands, the method of instruction was everywhere still the same. The teacher gave simple theoretical lectures and dictated appropriate prescriptions. The basis of these lectures, as mentioned above, was in almost all colleges the writings of Galen and the ancient physicians; indeed, in the beginning of the century the Arabians also were yet in common use — as e. g. with Rolfink at Jena. The ordinary language of the colleges was still Latin (in spite of the patriotic example of Theophrastus von Hohenheim, who could endure as little as Bismarck the foolish pride[2] of the Germans in displaying their knowledge of foreign languages), and a veritable storm was stirred up in university circles at the close of the century (1688), when the great Thomasius "ventured" to deliver lectures in German.

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[1] From the 17th century down earnest efforts have been made to get rid of this rabble, but success has been so slow that they have lasted down to the present century. Crystallomancers were a class of people, chiefly Italians, who sought after crystals, particularly in Thuringia, and besides this dabbled in medicine, like the pyrotechnists, cauterizers, moxa-setters and alchemists.

[2] "Bedientenstolz".

Although here and there certain physicians, e. g. Blaes, had private institutions for instruction, still the universities were the normal schools for physicians. The more zealous, and especially the more wealthy, students usually attended several of them, and particularly finished their course in the then flourishing universities of the Netherlands and France, where the instruction, especially clinical and anatomical instruction, was better than elsewhere. — The number of students was not large, particularly during the Thirty Years' War. Ingolstadt e. g. in 1629 had only nine, in 1633 only three, in 1647 two and even one. In 1648 it had again 16, and later 20. Between 1612 and 1631 the total number of students attending the university of Strassburg was 13; 1632–1648 it was four, and from this time to the close of the century, six.

Practical colleges, where the professors permitted the students to examine patients, examined them themselves, made the diagnosis in the presence of the students and prescribed suitable treatment, were introduced as an experiment by Willem van der Straten (1593–1681), burgomaster of Utrecht in the year 1636; in the same year, by Otto Heurnius (1577–1650) and Ewald Schrevelius (1575–1647), and then in 1648 by Albert Kyper (died 1655) of Königsberg, professor in Leyden. They were however abandoned as unsuitable for students. "The students preferred simply to have the diseases explained to them and the prescriptions given, rather than to be examined with reference to their own knowledge." In Prague too Cassini in 1690 and a Dr. Tudetino in 1699 permitted the students to attend the evening visitation of patients, but they made very little use of this permission. The most influential professor there, however, Joh. Fried. Loew von Ersfeld (1648–1727), lectured only upon theoretical medicine. (Hasner.) Sylvius, in consequence of his estimation and reputation, first introduced in 1658 the complete clinical method at Leyden, thus acquiring historical importance for himself and erecting a monument to his nation. By his great talent as a teacher he obtained such success that students flocked to him in great numbers from all lands, including even Italy. It is worthy of remark that, in contrast with Italy, where in the preceding century the students were still expected to take, and actually did take, the initiative in the arrangement of the curriculum, in this century the initiative proceeded from a professor, although the management of the universities was in other respects still the same as before. Since this time the controlling influence of the students has been lost, having received its weightiest blow from the Netherlands. In England too from the middle of the 17th century (until 1868), all students were required to be members of a college or hall, to reside there and to receive their instruction thence—a restriction which did not exist before this period. The clinical instruction was of course given in hospitals, and thus the suitable and healthful arrangement of these came finally to be discussed, and then improved.

Anatomy was now studied more frequently upon human bodies and promoted by the predilection of princes, particularly in Italy, so that at least occasional dissections were made in most of the universities.[1] This was more especially the case in the non-German institutions, to which for this reason the students flocked in great numbers. Most of the universities had already anatomical theatres, and received a larger number of bodies than in earlier times, so that Vieussens e. g. was able alone to dissect 500 of them. There was also in Dresden as early as 1617 an "Anatomiekammer", as the dissecting room was called most too characteristically in German at that time and subsequently. In these, stuffed birds — at that time a great rarity — and similar curiosities were also preserved.[2] Yet in Germany the study of anatomy at this period was generally at a low ebb, so that when Rolfink at Jena — in the beginning of the 17th century the most popular of the German universities — in 1629 arranged two public dissections upon "executed malefactors", this was considered such an event that the very highest authorities (who now in Germany and England, as of old in Alexandria and in the 16th century even in Italy, interested themselves in anatomy) were present thereat. In Ingolstadt too, the laity were permitted to be present at the single annual dissection which was allowed, so that this concession seems to have been the general rule. Among the peasants of the vicinity, however, such an unheard-of "fashion", and the fear that all the bodies in the cemeteries would now be stolen by the students, awakened such terror and such caution, that the fresh graves[3] were watched by night, so that the corpses might not be dug up and "Rolfinked"! From 1631 on, however, the same Rolfink managed to have annual dissections in the dissecting room at Jena, and Conring was treated to the very characteristic charge of prosecuting anatomy and vivisections (at that time as much practised almost as to-day) *usque ad nauseam.* Indeed he himself was so "inspirited" by these dissections that he felt able to charge Hippocrates with being a bungler and an ignoramus in anatomy — at that time a heresy much more dangerous than it is to-day to fail to swear by the clinicians and their voluminous corpora medicinæ.

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[1] Cruel anatomical investigations were also made upon living dogs, and Conring even declared such studies the favorite occupation of his leisure hours.

[2] John Evelyn, who visited Leyden in 1641, makes the following record in his diary: "I was much pleased with a sight of their Anatomy schole, theater, and repository adjoyning, which is well furnish'd with natural curiosities; skeletons from the whale and eliphant to the fly and spider, which last is a very delicate piece of art, to see how the bones (if I may so call them) of so tender an insect could be separated from the mucilaginous parts of yt minute animal. Amongst a great variety of other things, I was shew'd the knife newly taken out of a drunken Dutchman's guts by an incision in his side, after it had slipped from his fingers into his stomach. The picture of the chyrurgeon and his patient, both living, were there." (H.)

[3] In England, even as late as the beginning of the present century, anatomical material was supplied almost exclusively by grave-robbers. Bodies were also stolen by the students. In America too — in imitation of the English custom — purveyors of anatomical material existed a short time ago. In both countries crimes were committed in order to secure "material". The providing of anatomical institutions with bodies was regulated by law in England in 1832. [Unfortunately grave-robbing and even the crime of "Burking" are not entirely unknown to our criminal courts to-day. Most of the states have some excuse for an "Anatomy Law", though between the defects of the laws themselves and the inefficiency of their administration the situation of practical anatomy in the United States is far from satisfactory. Pennsylvania, however, secured an excellent "Anatomy Act" in 1883 and Illinois a similar one in 1885. (H.)]

Vienna did not acquire a skeleton until 1658; Strassburg obtained a male skeleton in 1671, and several years later the skeleton of a female. In Edinburgh an anatomical theater was first erected in "Surgeons' Hall" in 1697. It may be remarked here that anatomical plates designed to be lifted off in layers existed even at this period, e. g. the "Catoptri microcosmici visio prima, secunda et tertia etc.", 1613, cut by Stephen Michelspacher.

Occupation with practical anatomy was, of course, still regarded by the higher physicians as a business unworthy of them. They, therefore, left it to the inferior surgeons, and merely pointed out and explained themselves with a staff what the surgeon had exposed. Thus it occurred that many surgeons of this period were the best anatomists and teachers of anatomy. Thus too may be explained the story that in Heidelberg, about the middle of the century, there arose at the bedside of the margrave of Baden a difference of opinion between two learned professors and the ordinary physician — at all events also a medicus purus — whether a plaster for the illustrious margravian heart, in order to cover that organ, should be placed in the middle of the chest, according to Galen, or upon the left side. The dispute was settled by opening before the eyes of the noble patient — a hog, by means of which it was demonstrated that, as a matter of fact, the heart of the hog lay on the left side. This evidence so firmly convinced His Excellency that his own internal arrangements were quite the same as those of the hog, that he at once dismissed from his position as ordinary physician his own attendant, who had held the contrary opinion as to the position of a nobleman's heart.

How rare dissections were in Germany may be learned from the fact that in Frankfort-on-the-Main they were given in the seventeenth century only in the years 1615, 1619, 1646, 1675, 1677, 1678, 1680 (the last three by Irenæus Vehr, died 1710), and 1683 by Bernh. Albinus. They were always accompanied by festivities which lasted several days.[1] Not only physicians, but also other professors and students, together with the laity of high position, took part in them. On the occasion of the dissection in 1619 it was said that the vena azygos was found to empty into the excretory duct of the left kidney, "whereby it is clear that diuretics are suitable for persons with pleurisy, and that pus may be discharged by the urinary passages." — In 1675 a child-murderess was, in accordance with the law, sewed up in a sack and drowned. From her body the "Pharmakopōus" collected twenty kilogrammes of fat. In the year 1678 the dissection of another child-murderess took place, and it is mentioned that the subject had very fat buttocks and wonderfully stout breasts. She had gall-stones also, and her skeleton was preserved. — For the repair of the "Anatomiekammer" and the restoration of an anatomical theatre, the Elector in 1684 gave 100 Thaler; the remainder Albinus furnished from his own pocket. Strassburg received her first professor of anatomy in the person of Joh. Albert Sebiz in 1652, and a horrible hole was assigned for an "Anatomiekammer". (Until a short time before the medical course of the author of this work, a similar hole for the study of anatomy existed at Giessen.)

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[1] John Evelyn records in his diary for the year 1646: "Three days after this I tooke my leave of Venice and went to Padoa, to be present at the famous Anatomie Lecture, which is here celebrated with extraordinary apparatus, lasting almost a whole moneth. During this time I saw a woman, a child and a man dissected with all the manual operations of the chirurgeon on the humane body. The one was performed by Cavalier Vestlingius and Dr. Jo. Athelsteinus Leonænas, of whom I purchased those rare tables of Veines and Nerves, and caus'd him to prepare a third of the Lungs, Liver and Nervi sexti par, with the Gastric Veines, which I sent into England, and afterwards presented to the Royall Society, being the first of that kind that had been seen there, and for aught I know in the world,

Botanic gardens and chemical laboratories for purposes of instruction existed in many universities. One was established in Strassburg in 1619, and Oxford received the first in England in 1622.[1] The chemical laboratories, however, were mostly the private property of the teachers. The famous Kunkel e. g. had one when he was in Wittenberg and delivered the "collegium chymicum", which up to this time had been lacking there.

His account of his own experience furnishes us a glance into the condition of the universities of that day. He says: "Therefore I was permitted to establish such a collegium, and I also received a considerable number of studiosos medicinæ, among whom Christ. Vater (1651–1735; father of the anatomist Abraham Vater, 1684–1751, professor in Wittenberg) was the most curious, zealous and grateful. I likewise found that it was a sour morsel of bread (hard task) to support oneself by studiosis. Part of them imagined that the conditions in this collegio were the same as in others, where the instruction consists in transcribing words (!); nay, but care and labor belong to it. Among them there were not more than three of these . . . . The longer also I continued in the work, the more disgusted I became, and I saw, and found in my conscience, that I could not henceforth with justice accept money from the parents of such people" — a conscientiousness rare, but worthy of imitation!

The general barbarity of the seventeenth century and the immorality, especially among the upper classes, which toward the end of the century spreading from France had become naturalized in both Germany and England, extended even to the universities, the professors and, of course, to the students. The life of the latter during this period was accordingly more vulgar and rude than ever before, although subsequently it was in some respects, and in some places, about as bad. At this time Pennalism and its results were in full bloom, that is to say barbarity towards the younger

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tho' afterwards there were others. When the Anatomie Lectures, which were in the mornings, were ended, I went to see cures don in the Hospitals; and certainly as there are the greatest helps and the most skilfull physitians, so there are the most miserable and deplorable objects to exercise upon. Nor is there any, I should think, so powerfull an argument against the vice reigning in this licentious Country, as to be spectator of the miserie these poore creatures undergo. They are indeede very carefully attended, and with extraordinary charity." The anatomical plates referred to were presented to the Royal Society by Evelyn on his birthday, Oct. 31, 1667. (H.)

[1] The botanical garden of Edinburgh was established in 1680, and the apothecaries' garden at Chelsea in 1686. (H.)

students — Pennalen — on the part of the elder — Schoristen — was unbounded, and its outbreaks, even in the lecture rooms during the daily duties, were of such a nature that, in spite of many echoes of this system in our universities, we can to-day no longer form a correct conception of them. The state authorities were at last compelled to interfere against them — but in vain! Altdorf was scourged by this moral epidemic. "The plague, the horrible Pennalism, afflicted the university of Altdorf in 1623, and resulted in the highest grades of wantonness, immorality, frivolity and barbarity, so that it could not be exterminated by all the dissuasion, warnings and punishments exerted against it." This shamelessness of the scholars and students grew to such a pitch that those whose duty it was to study, to learn, to be obedient to their well-wishers, railed against their teachers, listened to them very little and valued them still less . . . . Scarcely a public lecture was delivered anywhere without insolent and unstinted interruptions by hissing, whistling and abominable noises. There was such a bellowing, shouting and howling that a passer-by would swear it was no lecture-room for men, but a resort for dogs, oxen and birds of prey. . . . . The vices which had crept in, the marching about the streets, the drinking by day and by night the shouting, duelling, murder, fornication and all such evils and highly reprehensible abuses, kept open all the windows of the academies of the students." At this period such conduct was "bully" ("forsch")! (Marx.) The ceremony of "Deposition" continued, and degenerated still more in these rude times. "In this ceremony the hide and horns of an ox were thrown over the 'Bean' (bec jaune, novice); the horns were then sawed off. Previously, however, the hair of the neophyte was pulled out with great wooden shears: 'Since thou, O shaggy buck, canst dispense with much hair, I must therefore, for decency's sake, shave thine head.' His ears were now cleaned with a spoon: 'I purify thine ears for instruction and not as a bad trick.' His 'Bacchant-tooth' was pulled out: 'Let thy Bacchant-tooth of slander be drawn; calumniation shalt thou ever shun like hell itself.' His nails were filed with a huge file: 'I file thine hands to signify that with them thou shalt work, as is fair.' A large moustache was painted upon his lip: 'I paint thee a beard that henceforth thou mayest behave like a beardless child.' Now followed the hand-kissing. Salt was placed in the mouth of the neophyte and wine was poured upon his head: 'Let him receive the salt of wisdom, let him take the wine of pleasure! May God multiply upon you, ye students, both wisdom and joys!' Of course a banquet followed, in mockery of all prescribed regulations." (K. Grün, Culturgeschichte des 17en Jahrhunderts.) These were degenerations of mediæval guild-ceremonies and outbursts of youthful wantonness and rudeness, which simply outgrew their age. "In the villages the students crowded into the pulpits, drowned the voice of the preacher with boastful words preached in a state of deep intoxication, raised a laugh among the peasants by their odd pranks, ordered bag-pipes and shawms, dragged the Gretchens and Elsies out of the pews into the dance, danced jigs etc. etc. — At weddings they drank up all the beer and broke the ribs of the guests, or stabbed them with the sword. The wearing of straight swords, pikes and fire-arms, in consequence of the continual duelling, was always prohibited, but always without results. As early as 1570 the Elector of Saxony was compelled to confirm a statute of the senate designed to restrain murder among the students, lest the universities should become alarm-posts, rendezvous for fighting and slaughter-houses." (l. c.)

Numerous learned societies labored in the prosecution of scientific pursuits, and in supplementing the instruction of the universities.

A large proportion of the professors of medicine too were highly learned men, frequently marvellous savants, whose knowledge and their perrukes in this rococo age were equally extensive. For a disposition to scholastic erudition, embracing everything in its scope, ruled the 17th century, so that we might call many of these savants the last of the Scholastics. The medical men, however, were not simple compilers and savants, but frequently also very zealous investigators, and withal touchy and some of them disputatious (as they are, indeed to-day), so that while they usually conducted themselves with great learning, they were not always over-polite. The latter fault, however, was characteristic of the manners of the time. They themselves, like their language — almost all of them wrote Latin only, or more rarely a German mixed with Latin — were cosmopolitan in their scientific intercourse, though this was less the case than in the sixteenth century. Not rarely too they changed their positions, especially as a large part of them were still not permanently settled, but were appointed merely for a certain term of years. The Thirty Years' War too drove them frequently as "Exiles" from their previous positions and residences for a shorter or longer period. Moreover one and the same savant, with the utmost versatility, often represented the most different branches, e. g. medicine, history and poetry, like Meibomius, or philosophy, philology, archæology, geometry and medicine, like one of the Bartholins. Besides these branches they occupied themselves with special frequency with chemistry. Many of them were distinguished mathematicians and physicists. Some were microscopists, for in this century the general method of investigation was almost entirely the so-called exact method. Some of the professors were physicians-in-ordinary, frequently with considerable salaries.[1] — Thus Conring e. g. was offered 9000 marks to become physician-in-ordinary in Sweden. The salary of professors, however, was generally small — as a rule hardly 200 marks ($50), at most 1000 marks ($250). The more famous and popular physicians frequently gave consultations by letter to patients in foreign countries. Many had valuable private collections, as e. g. Ruysch, who sold his anatomical collection to Peter the Great for the enormous sum, for that day, of 51300 marks. This occurred just at the beginning of the eighteenth century.

Instruction in surgery was well regulated nowhere but in France, for this was the only country which possessed a surgical college proper, and maintained an entirely independent surgical faculty. The earlier privileges of the surgeons were restored, and in 1671 separate localities for the lectures of the professors of surgery, and permission to perform dissections, were also granted. Moreover the dispute of the Paris faculty about precedence and the barbers had at this time entered upon a new phase, though it was not finally concluded.

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[1] The usual salary of the Physician-in-ordinary to the king in England during the 17th century seems to have been £100, though it varied somewhat, probably in accordance with the celebrity of the individual. The famous Theodore Turquet de Mayerne, who was appointed Physician-in-ordinary to both the king and queen in 1611, received £400 per annum, and an annuity of £200 was settled upon his wife. Mayerne was also exempted from all taxation, and received the honor of knighthood in 1624. Wiseman's salary as Surgeon-in-ordinary in 1661 was £150, though Ant. De Choqueux in 1665 received only £80. In 1626 Dr. John Collins was appointed "Physic Professor" in the university of Cambridge with a salary of £40. In 1667 the king had eight physicians, and four surgeons-in-ordinary. (H.)

Such jealous disputes about competency between physicians and surgeons,[1] and even between surgeons, barbers and hair-dressers (for the latter, like the specialists for diseases of the hair to-day, were also counted members of the medical faculty), in which the physicians often played the more melancholy rôle, were very frequent. They were carried on during the whole century, not only in France, which in this respect undoubtedly "illumined the way in the struggle for the highest good of civilization", but also in almost all countries, in England, Germany, Denmark — in the latter country the dispute related to practice only. In Italy alone they are not mentioned, either in this or the preceding century. In the latter country the surgeons never occupied a position utterly and entirely separate from medicine, and thus in the seventeenth century the professorship of surgery in the universities was everywhere filled by the most distinguished professors, especially those of anatomy, which branch and surgery in the succeeding century too were everywhere regarded as almost necessarily dependent upon each other. Hence too it resulted that German physicians, educated, however, in Italy, were the first to devote themselves to practical surgery in their own home. In fact in Germany also professors of anatomy occupied the chair of surgery, e. g. Rolfink; yet Wundärzte and inferior surgeons for the most part followed the course of instruction of their guild. Accordingly the most important German "Wundärzte" — so the best educated surgeons were called — of the seventeenth century still came from the barber-shops alone, and supplemented their defective medical and general education by self-instruction, or chiefly by travelling from city to city, and from one famous practitioner of their art to another if possible still more celebrated. These higher Wundärzte were mostly by nature men of special talent in their branch, who had chosen it from love of its duties and to gain a better social position, and they devoted themselves with enthusiasm to the study of their art, in circumstances and situations often of great difficulty. Many of these men, worthy of the highest respect and often springing from hovels of the deepest poverty, struggled after learning and gained its rewards, while want and bitter hunger were fellow-students and companions on their journeys.

In the seventeenth century practical instruction in midwifery, as a branch distinct from surgery, was not yet imparted to men. At most they merely studied it theoretically. Daily practice, then as now, was often compelled, at the expense of the patients, to fill the place of a supplementary teacher, and to supply the want of preceding personal management under the guidance of a teacher and the lack of the observation of nature. The sole public institution in which practical instruction in midwifery was imparted, the obstetric section of the Hôtel-Dieu at Paris, was firmly closed against men. Yet, in spite of this, many surgeons were, and became by their private practice, distinguished obstetricians,—accoucheurs, as they called themselves after the famous accouchement of La Vallière — and they also displayed scientific ability.

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[1] We must not blame either party too severely, for in the century of long perrukes both bloodless and bloody dissensions prevailed at the French court over the question which of the lords or ladies should offer to the king his napkin, or to the queen her chemise — characteristic matters of historical importance for this curl-flourishing, rococo-age, and noble productions of the absolute doctrine of God's grace! Among physicians and surgeons too pecuniary interest (which as we know puts an end to all good-feeling and fellowship) played a part, not mere servility as among courtiers.

Practical instruction for midwives was imparted in Paris alone, in the special institution just mentioned, and by superior midwives, who not infrequently were also authoresses in their own department. The course lasted three months, six weeks of which were employed in the learning and practice of the practical portions of the art. — In Germany the old method of guild[1] instruction still prevailed for the most part; that is old midwives took the young under their teaching, or the (city) physicians and surgeons imparted instruction to them. The latter were the chief practitioners of operative midwifery in difficult cases. The instruction was given in accordance with the numerous manuals for midwives which already existed, under the direction of the magistrates and by order of the city. In many places the nurses were compelled to pass an examination by the city physician, and, if successful in this, were then sworn into service. — The same method prevailed also among the other Germanic peoples, with whom midwives almost exclusively everywhere practised midwifery. — That among these many were still extremely ignorant, is manifest from the fact that one of them took the inverted uterus for the placenta — a mistake which might undoubtedly occur to-day also — and simply cut it off — which could scarcely happen at the present day. — After the publication of a medical ordinance in 1685, the midwives in the electorate of Brandenburg, like the barbers and bath-keepers, were examined by the professors at Frankfort-on-the-Oder.

The barbers continued to receive their instruction from the guild-masters. In Saxony after 1641 they were required to pass an examination before the four oldest masters and the city-physician (Stadtphysicus), in which examination they were questioned upon the treatment of gun-shot wounds, like military physicians. Before admission to the examination they must bring evidence, of course, of the legitimacy of their birth, that they had studied three years and had for three years travelled as apprentices. The examination was followed by the "Meisterstück" (masterpiece) and, of course, the "Meisteressen" (masters' banquet), in accordance with the immemorial custom of the guild (Frölich). In spite, however, of all the improvements of the examinations (and there were others than that just mentioned), it is said of the barbers: "Most of them trouble themselves very little with anatomy and surgery, and if they can only attend to customers, cut hair à la mode and shave the beard properly, it is quite enough." Besides these duties, however, they also supplied surgical aid

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[1] Peter Chamberlen (II) endeavored to effect the incorporation of the English midwives in 1616, and his son Peter (III) vainly attempted the same thing in 1634. The opposition of the physicians, and even of the midwives themselves, proved insuperable, nor was the character of the advocate of the project such as to render his advocacy very influential. (H.)

(as they did long after this period), and had establishments (Schwitzstuben) of their own, where they treated syphilis with mercurial fumigations and sweating. Inunctions for the production of salivation they performed at home, or at the houses of the patients themselves.

Instruction in pharmacy was imparted by the master-apothecaries. The examination, however, took place generally before a mixed commission of physicians and apothecaries — in the electorate of Brandenburg after 1685 before the professors — and a masterpiece was required. In France the master-apothecaries were examined by the Faculty, but in some cities several years' service in a hospital exempted them from examination. As at an earlier period, this examination consisted of three parts, viz. that for the apprentices, the assistants and the masters. In France it consisted in the reading of formulæ, an examination on simples and the masters' examination. The examinations were purely dogmatic, not only in Germany, but likewise in France. Molière, as we know, ridiculed the vicious methods of examination in the latter country.

The expenses of graduation of a medical student were very great, and the public act of graduation was generally celebrated with much ceremony. Often there was music etc. for two days. Hence in 1683 appeared the following edict and mandate: "Frederick William, by the Grace of God Margrave of Brandenburg, Arch-chamberlain of the Imperial Roman Empire, Elector of Prussia, Magdeburg, Jülich etc.

Imprimis. — To my worthy, high and well instructed, trusty and beloved lieges, gracious greeting. Upon what grounds we have been induced to reduce the expense of the promotiones of licentiates and doctors, heretofore by custom far too high, ye may see from the enclosed original document; and we hereby graciously charge you to keep this our ordinance entirely and without any objections, decently and inviolably, which we most graciously expect of you, and bear to you a gracious benevolence. Given at Potsdam, July 14, 1683. Frederick, Elector-Prince.

By His Serenity, the Electoral Prince of Brandenburg etc. — It has come to the notice of our most gracious Prince that in the promotionibus licentiatorum et doctorum in the juristic and medical Faculty at Frankfort-on-the-Oder, by reason of the expensive convivia many students, although they lay there the foundation of their studies, betake themselves to foreign and distant places, where they may attain at less cost the honores academicos, while others who have not the means to travel to other places omit their grade because they cannot sustain so great expense: therefore His Serenity etc. has thought that this burden should be reduced.

1. When a Solennis Promotio Doctoralis is celebrated in the churches, the convivium shall be so reduced that: 1. It shall continue for one evening meal only, and no person shall be invited on the next day. 2. No ladies[1] shall be invited thereto. 3. No more than ten kinds of food, pastry included, shall be embraced in the bill of fare, and 4. Confectionery shall be entirely excluded.

2. When there are one or two candidati for the gradum Doctoris, but it becomes burdensome to furnish the sumptus which must be employed in a solemn graduation in the churches and otherwise in accordance with the directions of the statutes; then one of each Faculty above named shall be at liberty to publickly proclaim such candidatos as Doctores in the Auditorio majori, after the confirmation of his Electoral

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[1] Euphemistically for women of easy virtue, who were very common at the universities, where all sorts of vice prevailed.

Highness has been obtained, and after passing the examinations customary in solemn graduation, so that only half the otherwise customary munera may be offered to the professors in all Faculties. However, in this case the distribution of gloves, as well as the convivium doctorale, shall be omitted, unless the Doctorandi invite some few professors to a very modest repast, which shall be left to their discretion.

3. The Renuntiationes Licentiatorum, after the conclusion of the Examinum and in the Disputatione publica inaugurali, heretofore usually held in facultate juridica, may in future take place in facultate medica privatim in consessu facultatis, in order that thus the expensive convivium may be avoided: provided, however, that in all cases the confirmation of the Elector for each of the Candidatorum shall be first obtained. — Wherefore. most highly informed, His Princely Serenity charges the University of Frankfort-on-the-Oder herewith most graciously and also earnestly to keep this his most gracious ordinance rigidly, strictly and inviolably. Signatum Potsdam, July 14, 1683. Friedrich, Elector.

A very interesting insight into the scientific relations of this age of perruques and into the authority of the universities, is given by the transactions relating to the well-known book[1] of Justine Siegemundin, midwife of Brega, and by certain of its inquiries. "In 1681 Justine Siegemundin, a midwife of Brega in Silesia, asked the Faculty: 1. Whether it was not an offence against the rules of medicine for the nurse to give syrupus corallorum to a feeble, but otherwise healthy, new-born infant? 2. Whether it should be reckoned the fault of the nurse when, in case of sudden hæmorrhage on the part of the parturient woman, she orders aqua bursæ pastoris to be taken, and aqua carbunculi to be laid upon the wrists of the patient, but the latter in her absence takes the aqua carbunculi instead of the aqua bursæ pastoris? 3. Whether the nurse, according to her own judgment, could separate the afterbirth before the birth of the child without danger to the mother and infant? 4. Whether an immature child, thus forcibly delivered, could live in health until its third year, and whether, if it subsequently died, that hastening of its birth could be the cause of its subsequent death? To all four inquiries the answer was No. The Faculty was further asked whether a person affected with chronic gonorrhœa should be permitted to enjoy coitus, and whether such a person was capable of begetting children. This book of Justine Siegemundin, especially as it was written in German, met with great opposition, and, although it had passed the censorship of the university of Frankfort, it gave rise to a thesis at Leipzig, maintaining that many procedures which were praised in the work depended upon empty speculation and in practice were absurd; so that the writer could not understand how it had passed the censorship. Justine complained of this, and several academic papers were published by the university of Frankfort in opposition to this thesis.

Before we attempt an exposition of the practical relations of the medical profession, it should be mentioned that in France a thorough change was undertaken in hospital affairs, which could not but exercise a beneficent influence upon the practice of that country. In 1656 and 1662 the horrible leprosy-hospitals in that country, with their endowments, were finally abolished by Louis XIV., and by means of the money thus obtained hospitals were erected upon a definite system throughout France. The latter, too, were bad enough. Some conception of the great wealth and the number of these houses may be formed when we learn that, as the result of this ordinance, hospitals were erected in 1130 municipalities. The account of a patient who in 1657 was sick in the Hôtel-Dieu in Paris, says that in each ward were four rows of beds, and each ward contained also an altar and a dining-table. A single apothecary-shop provided for all the patients, and 300 nuns furnished the hospital with nurses. Besides these, there were nine priests, six apothecary's apprentices, eight barber's apprentices, women to take care of the pregnant and lying-in patients, servants in the kitchen, bakery, wash-house and apothecary-shop. Before the reception of a patient he was examined, if a man, by a barber, if a woman, by a nun, and then carried away to a priest, who wrote his name etc. in a book and tied a card with this information written upon it upon the patient's left hand. He was then assigned to a bed with two other patients, and the first thing he was expected to do was — to confess. If he was a Protestant and would not confess, he was subjected to all sorts of questionings and proselytism. About 7 A. M. bread and wine were administered; about 8 A. M., soup and eggs; about 12 M., soup, meat and barley-water. The latter was also freely supplied for drink by day, and stewed prunes were furnished at night. The treatment consisted in venesection — on our present patient performed twenty times — and enemata, and medically, in various bowls of medicine furnished by the apothecary's servants. Women from the city furnished pleasant drinks and confectionery. Moribund patients were placed in a bed by themselves and extreme unction administered, or as our naïve tailor's apprentice expresses it — they were greased. The dead were tied in a sack, all collected into one wagon, borne to a common grave, cast into it and covered with lime. Those who got well received their clothing according to their cards, and went their way. Our patient says of the surgeons that they were very ready in amputating limbs, and that many of their victims died, while many were discharged with one leg etc.

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[1] "Die Chur-Brandenburgische Hoff-Wehe-Mutter, das ist: Ein höchst nöthiger Unterricht von schweren und unrecht-stehenden Geburten, in einem Gespräch vorgestellet" etc.. Cölln a. d. Spree, 1690. (H.)

The medical ordinances, now quite numerous, were usually combined with others relating to apothecaries; for the seventeenth century presents us with numerous examples of police regulations. Thus in 1607 the dukes of Saxony published a "renovated and improved ordinance for physicians and apothecaries"; in 1685 the electorate of Brandenburg issued similar regulations, and many other larger and smaller states and cities followed these examples.

Permission to practise, however, continued to be granted by the Faculties alone, and it was not until the following century that this right was restricted by the state (Prussia). Whoever had received permission to practise from one of the German universities was always accredited to the entire German nation. Complete liberty to emigrate also prevailed without any ceremony, though in many of the free cities, e. g. Frankfort, permission must first be applied for.

Through the protection of the state, now more effectively afforded, the profession of physicians, as such, attained greater respect, and the high consideration which physicians enjoyed in the eighteenth century was thus prepared in the seventeenth. Indeed, in a general way, the seventeenth century may be called the century of aggrandizement of physicians, i. e. a century characterized by the improvement of their position in the eyes of the public.

The physicians proper (medici puri) of the seventeenth century were still persons of the profoundest gravity, with fur-trimmed robes, perrukes, cane and sword (when matters were prosperous), who for their life would do nothing more than write prescriptions in the Galenic, iatro-chemical, iatro-mathematical or spagyric style. Everything else they considered beneath their dignity — as they do in England even at the present day. On the other hand, however, they demanded to be called into every case, even though they knew nothing about it. In this way alone they claimed that all would go straight, and even in operations by the surgeons, barbers and midwives, whether surgical or obstetrical in character, and of which they knew nothing at all, they yet demanded that a physician should be called in. In dangerous cases, however, e. g. in the plague, they allowed themselves to send the surgeons alone to the sick, while they merely looked at the latter through the panes of glass. If, however, they were compelled to visit such patients even once, they were advised by Minderer each time to repeat beforehand the 22d Psalm, a performance which, if the physician had a tolerably large practice, must have consumed considerable time. In spite of these peculiarities they were generally esteemed, and were often, in some way or another (usually for a definite term of years only), commissioned either as city (or state) physicians, or as court-physicians in the greater or lesser courts at that period so numerous, or as physicians-in-ordinary. As state-physicians, the first mentioned class frequently officiated also in colleges ad hoc, in times of the plague or other epidemics, in medico-legal cases etc. In France, however, these officials had quite unheard-of duties, in addition to those already mentioned. Among these was e. g. the "exact" proof of the sexual potency of men, which question was decided upon the declaration or sensations of a female expert in the form of an old woman or a midwife (!), who submitted herself to the proof in presence of (!!) the physicians or surgeons — a scandal which was not abolished until 1677 by an act of Parliament.

The "state-physicians" (Staatsärzte) of later times manifestly descended from these salaried and commissioned city-physicians (Stadtärzte): for the subsequent designation of the former, i. e. "Physici", was originally borne by the city-physicians. Thus e. g. in 1607 there were in the free imperial city of Wimpfen two physicians, a "Physicus" and a "Medicus" (besides two apothecaries). The "Physicus" received an annual salary of four malters of corn, four cords of wood, a free residence and 68 marks. In the course of the century this salary often changed, so that it rose as high as 103 marks, and fell as low as 42 marks, 8.5 marks for house-rent and four malters of spelt, the latter in the year 1653. The "Medicus" was what is to-day called a simple practising physician. This memorandum of salary and other information with reference to the physicians of Wimpfen is one of the earliest examples of a *marked* distinction between the Physicus and Medicus, in the more modern sense, i. e. of the transfer of the title "Physicus" (given in the Middle Ages to all the higher physicians) to such physicians only as possessed definite commissions. Since this makes its appearance as early as the beginning of the seventeenth century, we may conclude that this distinctive title had been formed much earlier. It would seem, however, that special state-physicians, with regular and permanent commissions and assignment, did not exist in Germany during the seventeenth century, for even the medical ordinance of Brandenburg in the year 1685 does not designate such with any definiteness. In Frankfort there were medici ordinarii and sworn physicians. The youngest medicus was called medicus pestilentiarius, and was required to attend patients suffering from the plague. It should also be mentioned that very many physicians were skilled astrologers. Even Kepler was compelled to officiate in this capacity! The manufacture of almanacs too was still often placed in the hands of physicians.

That physicians were also involved in the religious entanglements of this century is readily understood. Thus in Vienna it was decreed that all physicians must become Catholics *instanter*, and those who did not were to leave the city at once.

In consequence of the universally prevalent belief in astrology and alchemy, and the rage for searching after the philosophers' stone and the transmutation of baser metals into gold,[1] the physicians-in-ordinary were usually taken from the ranks of those who were likewise chemists (a very common thing among the physicians of this century, so devoted to the natural sciences), and in fact from among the pure Adepts, as they were called. Thus e. g. Mynsicht[2] was appointed physician-in-ordinary in 1631, with a salary of 900 marks, a free residence and two loads of charcoal for use in distilling. So Becher, physician-in-ordinary at Mayence and then at Munich, received a good laboratory (almost every prince and high lord had such a laboratory); Dr. Geo. Krembs (died 1648) received a salary of 850 marks ($212) as court physician etc.[3] Many physicians, probably with a view to public and private health, were also appointed to non-medical positions, especially that of burgomaster, an arrangement which is uncommon at the present day. Some also occupied the position of teachers, directors etc. of the Gymnasia,[4] and in Holland they even became Presidents of the

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1. The latter pursuit was designed to fill the purses of the numerous potentates, which had been emptied by the war and the dissoluteness of court life; but it really served merely to while away their time in "curious" experiments at the expense of their dear bought gold.
2. He was "Pfalzgraf", a rank corresponding to that of the Roman "Comes", and including the authority to legitimise illegitimate children (except those of princes, counts and barons), to confer the lower and higher academic grades up to Doctor inclusive — the recipient was then styled Dr. bullatus — to exercise guardianship over minors, to crown poets etc. — What sums were consumed in the curious hobbies of the princes of the 17th century, and what fees the chemists received, may be judged from the fact that Kunkel e. g. for the invention of red glass received from the elector Frederick William a present of 100 ducats. The first cup made of this glass — it weighed about 24 pounds — cost the elector of Cologne 2,400 marks ($600), and the glass-cutters paid 12 marks for half an ounce of the material.
3. In 1660 Nicholas Le Fevre was appointed to the office of Professor of Chemistry and Apothecary in Ordinary to the Royal Family of England at a salary of £150. The salary, however, seems to have been very difficult to obtain, for in 1663 he petitions for the wages, allowances etc. due him since 1660, "of which he has as yet received nothing." (H.)
4. For example: Georg Henisch (1549–1618) of Bartfelden in Hungary, was a physician and professor of mathematics in the gymnasium of Augsburg; Tobias Andreæ (1638–1685), professor of philosophy in Bremen and Franecker; Chr. Friedrich Crocius (1623–1673), professor of the oriental languages in Bremen; Th. J. Almeloveen (1657–1712), professor of medicine and oratory; H. Arnisaus (died 1636), professor of medicine and philosophy; Jac. Bartsch (died 1633), physician and professor of mathematics; Heinr. Fabricius (died 1612), physician and director of the gymnasium; Jacob Folius, physician and school-director etc. (Marx). Paul Flemming (died 1640), a physician and poet of Hamburg, belonged among the numerous disciples of Æsculapius endowed with poetic genius.

Admiralty. Bath-physicians, in our modern sense of the term, seem still to have been few in number. Yet physicians were often entrusted with the examination of mineral waters (with very artless results), and domestic practitioners were interrogated by patients as to the effect of the waters.

The statements of Dr. M. R. Buck regarding the customs of the bathing resorts in the 17th century are very interesting. Life at the baths was very free and easy, and a "cure" ordinarily lasted 32 days, of which 124 hours were passed in the bath. A shorter course lasted only 16 days, though precisely the same number of hours was passed in the bath. Of course during such prolonged sojourns in the water an abundance of food was furnished the patients — it was supplied every two hours — and very naturally the bathers amused themselves by gossip and even singing. Even delicate ladies ate up to 25 eggs a day, and drank in addition 6 to 8 quarts of wine. On the other hand, cupping and venesection were energetically employed, even out of friendship and to gratify another. Venesection was looked upon as a prophylactic and derivative against bad humors. The period when the "cure" was concluded was a sort of festival, and terminated with a little sport. A countess Walkenstein about 1635 paid the bath-keeper ordinarily 4 marks for venesection and 1.20 marks for cupping. In Petersthal there were apartments for common people, and others for patients of higher social position. The former paid for these 12 to 24 pfennige (3 to 6 cents) per week; the latter, for a sitting-room and bed-room, 3.60 marks per week, or, if occupied by several persons, 5.10 marks. The price of each room was affixed to the door. A precise diet was fixed upon by the authorities, and polite behavior was likewise prescribed. Religious conversation, i. e. disputes, was prohibited, as it was in other bathing resorts and is to-day in Leuk. There were likewise directions for the bath-physicians and a complete bath-ordinance, which was designed to protect them from the jealousy of rivals. In spite of all regulations, however, magnificence and ostentation in dress could not be guarded against, any more than immorality etc. The latter surpassed in luxuriance even the gambling bathing-resorts of our own century. Petersthal in the Black Forest had too, as early as 1686, regular mail communication three times a week.

Most of the German physicians enjoyed merely moderate prosperity, although (perhaps rather because) tariff ordinances existed everywhere, while in France and England some individual physicians had immense incomes, a fact which we do not find stated of any German doctor. Thus Mead's[1] practice e. g. brought in £3750 annually, and Harvey before him, who had no very large income according to English ideas, possessed at his death an estate of £20,000, in spite of the fact that he had already spent much money on charitable objects. By the way, it may be remarked that Harvey made his professional visits on horseback, as was the custom in London at that period, and that a servant carrying his instruments rode a short distance behind him. Conring, when he went to Sweden as actual physician-in-ordinary (he already held the title of that office), is said to have received in the year 1658 an annual salary of 3000 rix-dollars, and as Danish Counsellor of State he enjoyed a salary of 1000 thalers; while as early as 1650 the sum of 1600 thalers was offered him in vain when he was in Sweden at the solicitation of queen Christina. From Louis XIV too he received when at home a "pension, such as was given to many other famous persons at that time." Doubtless, as Marx states, at that period — and we may add also long afterwards — the patriotism of the Germans was not so highly cultivated as it is to-day; and yet Conring was desirous of protecting himself against charges of want of patriotism: "I hope that on this account no adverse suspicion may be aroused: otherwise I would never touch the money." And this was said in spite of the fact that the man had eleven children and was himself a sufferer from stone — certainly good evidence of patriotic feeling. The latter was more developed in Leibnitz, who deeply mourned the influence upon Germany of French money, French mistresses and the passion for imitating foreign manners, which, as we know, Bismarck also stigmatized.

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[1] Mead, whose activity, however, belongs chiefly to the 18th century (he was born in 1673 and died in 1754), enjoyed for several years an income of £5,000 to £6 000. During one year his income rose to £7,000. His regular fee for an office consultation was one guinea, and for visits to the houses of persons of rank and good condition, two guineas. Like many of the eminent physicians of his day, he had also regular hours for consultation in some of the coffee-houses of the metropolis, where he was consulted by the apothecaries concerning their patients, and wrote prescriptions for them at the rate of half a guinea apiece. The famous gold-headed cane of the Jacobite physician and *bon vivant*, John Radcliffe, passed into the hands of his favorite and protegé, Mead, and thence into those of Askew, Pitcairn and Baillie, to be deposited, on the death of the latter in 1823, in the library of the College of Physicians, where it is still to be seen. — The "Levamen Infirmi", published in 1700, says: "To a graduate in physick his due is about ten shillings, though he commonly expects or demands twenty. Those that are only licensed physicians, their due is no more than six shillings and eight-pence, though they commonly demand ten shillings. A surgeon's fee is twelve-pence a

How highly the duties and the office of the physician were estimated by the better physicians of the seventeenth century may be readily inferred from the requirements of this same Conring: "Only a few upright, talented individuals, gifted with a natural inclination toward medicine should be admitted to that science." . . "Wide-awake, industrious, daring, philanthropic, agreeable persons, genteel and ready at all hours, were best fitted for the practice of medicine. Pure empiricism was out of the question, for reflection and comparison, the adjustment of the causes of health and disease, reasoning from the known to the unknown, were indispensable. In life certainly we do not find it a simple matter of theory, but of practical, active study. Those physicians who exerted themselves solely for the sake of knowledge were rare; for most of them gain and external honors were the motives. . . . The separation of medicine and surgery has been of incredible injury. The physician does not need to be a surgeon himself, any more than an architect to be a carpenter or a mason; but he should possess a knowledge of surgery." (Marx.) Yet it was a common matter of business to sell the title of doctor in the universities of almost all countries, as well in Germany, France etc. as in Spain. Cervantes in his Don Quixote derides the graduates of Siguenza and says that in Spain the small universities for the sum of two doubloons make a doctor out of an ass.

The pay of physicians at this time was regulated in most places in accordance with a definite tariff of prices, in which the process of cutting down the physician's honorarium by the state to the pay of a day-laborer

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mile, be his journey far or near: ten groats to set a bone broke or out of joint; and for letting blood one shilling; the cutting off or amputation of any limb is five pounds, but there is no settled price for the cure" (Jeaffreson). (H.)

continually progressed, until in the 19th century it has fallen below the bounds of decency. The rates of the ordinance of 1668 for Frankfort-on-the-Main and the first Prussian "ordinance" 1685 (see the account of medical relations in the 18th century) may be considered the average tariff for Germany. These ordinances were published "because the medical art through its abuse has fallen into derision, scorn and abasement."

Hesse had such an ordinance as early as 1616. Family physicians had a sum in lump. Thus the physician of a countess in Munich received 100 marks ($25) annually. The city physicians had a fixed salary. Thus Malachias Geiger, who succeeded his father Tobias in 1633, received 340 marks ($85), and as remuneration for the visitation of the three city pharmacies, 171 marks in addition. Many of the "Pest-physicians" received large salaries, as e. g. B. Löw in Prague, who had 2000 marks ($500) per month. — The number of physicians cannot longer be called inconsiderable, as it was in the 16th century. In the middle of the 17th century there were in Basel, all together, nine professors and doctors of medicine, besides 18 surgeons and barbers; in Munich there were 17 physicians (besides 16 bath-keepers), of whom five belonged to the collegium medicum. The physicians of Munich too visited patients suffering with the plague protected by a mask, examined them with averted face and had a light burning between them and the patient! — According to the Frankfort medical ordinance testimonials must be presented before reception among the city physicians. No physician was permitted to prepare medicines, under a penalty of 17 marks. An office visit cost 40 pfennige (10 cents); a visit at the patient's house 1.35 marks (33 cents); in chronic cases the patient paid 1.70 marks (41 cents) per week. In consultation cases each physician received for the first visit one gold-gulden (about $1.75), and for each succeeding visit 85 pfennige (21 cents). A night visit cost 1.70 marks (41 cents). If the patients were foreigners the fee was one-half more. Visits to other cities were paid for at the rate of 1.50 marks per mile as travelling expenses, and 6 marks per diem. The wealthy paid *ad libitum*. For being present at a post mortem and rendering an opinion thereon, each physician received 7 marks (1.75). These rates, as we see, are high, and are an evidence of the high esteem of the physician's calling at that period, as compared with our own time. In France, on the other hand, the rates of medical fees are said to have been, in the provinces, as low as those of veterinary physicians in England. (Buckle.)

Moreover the German physicians, at this period at least, like the English down to the present time, seem to have possessed a noteworthy *esprit du corps*, which led them to distinguish themselves from, and to guard themselves against, spurious physicians. With this purpose in view, they frequently associated themselves into "Colleges" (Collegia medica), as e. g. the physicians of Augsburg (who as early even as 1582 had formed a union), those of Strassburg in 1675, of Munich and the newly founded association in Schweinefurt. These colleges had the settlement of controversies, rendered opinions with regard to faults in treatment etc.

Surgeons of the best stamp, most of whom were zealous and eager for knowledge and even eminent authors and highly esteemed socially (Stadtchirurgen, Leibchirurgen), were always rare in Germany during the seventeenth century. In this respect Germany presented a marked contrast with other countries, e. g. France. Some of the surgeons enjoyed the advantages of a higher education, as e. g. Fabricius Hildanus; most of them, however, were self-instructed, so far as everything outside the limits of guild-surgery was concerned. On the other hand, as regards ability they were practically, and often excellently, educated (judged by the rule of their day) by extensive guild-travels, in war etc., and not infrequently they were ingenious fellows and daring operators. Although subordinated to the oversight of the physicians, in this century they became more and more independent of them (if not *de lege* at least *de facto*), even in conservative England. The social emancipation of surgeons, which was completed in the following century, was prepared in the 17th, and the lower surgeons of that period were the "fathers of our modern surgery". The ordinary barbers (and to some extent the bath-keepers also) continued to flourish. The former were appointed "Pest-barbers" with special frequency. and of course there was no lack of city and court barbers. Many of these fellows were capable and reputable surgeons to boot. Most of them had travelled extensively before permanently settling themselves, and had gone even as far as Dutch India, or joined expeditions to the whale-fisheries, though their qualifications were not materially increased by the latter experience. "Some are still more venturesome and join expeditions to Batavia, India, or even to Greenland, in order to see a whale or the boiling of blubber. But what is the use of all this?" Among the itinerant practitioners the lithotomists were particularly prominent, especially in France. Often, however, indeed most commonly, these were empirics of the clerical order.

It was still usual to make a "masterpiece". In Frankfort the barbers were permitted to shave and bleed, and also to treat ordinary wounds, syphilis, fractures, dislocations etc. In bad cases, however, they were required to call in a medicus, and under no circumstances were they to administer purgatives. The consulting medicus received a fee of 3.5 marks: for a broken arm the barber received, when one bone was broken, 10.5 marks, when two bones were broken, 20.5 marks. For the treatment of a broken leg in old persons, whether one or both bones were broken, he received 30 marks, 85 pfennige; in children 12.5 marks. For a (partial) dislocation, 5.15 marks; for a complete dislocation, 10 marks, 15 pfennige; for a dislocation of the elbow or knee, 30.85 marks, or if the result was not good, the half of this sum. For the treatment of ordinary flesh-wounds he was allowed 1.70 marks; for severe wounds, 7.10 marks, large wounds of the nerves and arteries, 8.5 marks etc. Cases of syphilis were paid for according to the generosity of the patients. The first visit to a patient suffering from the plague cost, including medicine, 1.70 marks; each subsequent visit (including medicine, the dressing of wounds and even two visits a day if necessary), 1.70 marks per diem. A seton and its treatment until free suppuration set in cost 2.60 marks. Amputation of the arm cost 31 marks; of the leg with its treatment, 41 marks, or, if the patient died, half these prices. Raising a blister cost 1.70 marks. Oculists, herniotomists and lithotomists, whether foreign or domestic were required to obtain a license from the resident authorities of the guild before operating, and in severe cases they must call in a physician. Lithotomy cost 51 marks, or, if the patient died, half that sum (according to the Hessian tariff of 1865 also 51 marks!). Operations for cancer cost 41 marks; for cataract, on one eye 17 marks, on both, 25 marks, for hydrocele, 25 marks; herniotomy, 51 marks; for hare-lip, 11.5 marks etc. (Stricker.)

The business of nursing the sick, particularly in times of epidemics, still lay mostly in the hands of the religious orders. In Protestant localities these were replaced by the barbers, bath-keepers and midwives.

That there was then, as there is now (or rather soon will be, as the result of reopening the medical "trade" to everyone), in both the lower and upper strata of society, a large number of active charlatans and swindlers, is manifest from the catalogue quoted above, as well as from the efforts of physicians in their own defence, to which reference has also been made. However, a preliminary examination at least was then required in case of public and open practice, and a license was granted only upon the ground of this examination and the payment of market-fees and booth-fees into the treasury of the community, the guild etc. In case of bad results of the operations of these itinerant physicians, they were liable to penalties, which were often very severe. Thus e. g. a certain Hans Vohrl in 1659 was required to pay a fine of 455 marks ($114), and with the money the practical Suabians built a wall about their churchyard. The city treasury did not often, however, transact such profitable business, and the regular fee for a license was 85 pfennige to 1.70 marks (21–41 cents). These strolling mediæval characters, handed down from ancient times, were the physicians of the masses, and operated for hernia, couched cataracts, extracted teeth etc. Their business was occasionally very extensive and methodically organized. Thus one of these itinerant "physicians" appeared accompanied by fourteen assistants, whom he distributed among the different hamlets lying around his own head-quarters. Buffoonery, rope-dancing, theatrical representations, dancing bears, monkeys, "ladies" and such nonsense were matters of course. The favorite period for the appearance of these wonder-workers was the annual fair season, and the place of their exhibition, a booth in the most eligible square to be found. All kinds of jests, even those of an Abraham a Sta. Clara (1642–1709), rebounded from the stupidity and superstition of the masses. The plays and representations of these itinerant doctors were degenerations of the mediæval Mysteries (Mysterienspiele). After Innocent III. in 1210 had forbidden the clergy to participate in these plays, secular theatricals, jugglers etc. took their place. The latter "also practised quackery and sorcery", and at last had for their main object the procuring of patients for the itinerant doctors and miracle-workers. The masses were attracted by their tricks to become patients, and thus the tricks assumed a professional character.[1] — To the official medical corps, if such an expression may be allowed, belonged even yet the executioner and the hangman, since they might now and then take part in the investigation of cases of poisoning, and might demand 54 marks for their services, while the barber in the same case received only 45 marks! To send any one to the hangman meant then, as well as now, the same as to send him to the physician! — The hangmen of Nuremberg, J. Mich. Widmann (born 1642) and his son of the same name (born 1675), were very famous, and patients flocked to consult them as they do now to many "natural-physicians" (Naturaerzte). Shepherds also supplied surgical aid! — That in this natal age of secret societies a great number of Rosicrucians, Spagyrists and Adepts practised medicine need only be mentioned, though doubtless these fellows were not always deceivers and not infrequently deceived themselves quite as much as others! These itinerant physicians were called "Doctores teutonici", because they understood no Latin, whence probably originated the English expression "High-German Doctor" in the sense of charlatan, an expression still commonly employed, though no longer justifiable by facts.

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[1] These "mountebanks", as they were called, were equally common in England. We learn from the "State Papers" that in 1665 a license was granted to George Moretto, "in consideration of his skill in medicines and surgery, to practise in any part of the King's dominions, and to expose his medicines for sale publickly, by erecting a stage in the Market Place, or any other mode which he deems convenient, without molestation to himself or servant." — Endorsed "Mountebank". This Moretto calls himself "His Majesty's Surgeon" in his petition for a license. In 1664 one Charles Turland was also appointed "Bone setter in Ordinary" to the King! Similar licenses were granted in 1667 to the mountebanks Joannes

The surgeons of the seventeenth century, particularly in France, began to assume a position of especial honor as obstetricians, and in fact from this period onward were even called upon to attend ordinary cases of midwifery. This change was very largely the result of fashion, for after La Vallière had been attended in 1663 by J. Clément, the princesses of the period also hastened to place themselves under the care of male obstetricians, so that the French accoucheurs found themselves much engaged in travelling to cases of midwifery, as e. g. Clément, who went three times to attend the wife of Philip V. of Spain etc.[1]

In spite of the bitter struggle made against male midwifery by the midwives and the physicians, the practice henceforth remained established. Indeed in Italy, as early as the beginning of the seventeenth century, male midwifery was customary; yet in a general way it first dates from the famous accouchement referred to above, so that practical midwifery owes its great advancement, which began at this period, directly to the mistress of a king. In Holland the state appointed male midwives, and even regular physicians (as the example of van der Steeren proves) devoted attention to surgical or obstetrical operations, though of course against the opposition of the guild-surgeons. In this country, indeed, every bride of consequence received one of Deventer's delivery-stools as a portion of her dowry. — In Germany alone the women resisted to the utmost the

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Michaphilo, John Russell and Toussain Le Jond. Such itinerant practitioners were also called "Merry Andrews", from the jokes and buffoonery which they employed to attract the masses. (H.)

[1] The imitation of mistresses, however, was not the limit of the loyalty of this age, for courtiers even went so far as to permit themselves to be operated upon, like the king, who was cut for fistula in ano by Ch. François Felix (died 1703) with a *bistouri royal* invented for this special operation; and this although they themselves had no fistulæ! A curious evidence of courtesy in a still more curious place in this gallant and elegant age!

admission of male assistance in such cases. If such aid, however, was at last called in from necessity, it was frequently done secretly and with curious and excessively modest procedures. Obstetrician and patient tied each one end of a sheet about their necks, so that though the view of both parties was unobstructed above this guard, the female to be operated upon was protected from male observation as far as concerned her nether regions.

That the midwives — especially in Germany and England — administered "abortive" drugs and performed operations (German "handwirkten"[1]) lustily, and systematically disparaged male assistance etc. to the married women, need only be mentioned.

A few of them, however, did their duty honorably, and won respectable positions as "midwives-in-ordinary". In France the midwives also called themselves "accoucheuses", after the style of the men. It may be remarked here too, that in the latter country the Huguenot midwives (as well as the physicians and even the patients in hospital) were required after 1680 to renounce their faith if they wished to continue their business. In Holland, however, the midwives still held the patient upon their lap (Schoos), and hence they were here called simply "Schoossers".

Apothecaries, on the whole, still occupied the same position as in the sixteenth century, except that they were now trusted, if possible, still less than before. They were regarded as cunning rascals, and complaints were made of their high charges etc. Hence arose, of course, many new tariff ordinances, and inspections were also more frequent.

In France there were still apothecary-surgeons, as there are in England to-day. Even the regular clergy were apothecaries, and the grocers[2] were in constant com-

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[1] The surgeons belonged among the mechanics (in Austria even to very recent times), while the physicians were counted among the free artists. "Handwerk" is the literal translation of the Greek χειρουργία. [The same may be said of the English "Surgery" = "Chirurgery". H.]

[2] In England the apothecaries were separated from the grocers in 1617 by king James I., but the arrangement was strongly opposed by both parties, and as late as 1624 the king was forced to explain to the Lord Mayor and Aldermen of London that "he passed the patent to the Apothecary Company from his own judgment, for the health of his people, knowing that the Grocers are not competent judges of the practice of medicine. He intends to make good his well-founded act, and his intentions are to be made known to the Speaker, that his Majesty may preserve his proper right to take care for the good of his people." The apothecaries, besides compounding and dispensing medicines, claimed also the right of prescribing, and a chronic dispute relative to this subject was carried on with the physicians until the question was finally settled in favor of the apothecaries by the House of Lords in 1721. Apothecaries' Hall was built in 1670.

John Wolfgang Rumler was appointed apothecary-in-ordinary to Charles I. in 1625 with a salary of £40, which seems to have been the ordinary salary before the Restoration. In 1663, however, John Jones, apothecary to the Household of Charles II., received a salary of £60 and £12 board wages.

A bill of Thomas Hickes, apothecary, for medicines furnished to Edward Nicholas in 1633, gives the following articles and prices:

A dose of purging pills - - -	2s. 6d.,
A purge for your son - - - -	3s.
A purge for your worship - - -	3s. 6d.,
A glass of chalybeate wine - - -	4s.

petition with the latter. Hence arose long and frequently amusing disputes as to who was, properly speaking, the true apothecary, and who should continue to hold that position. At last the grocers were compelled to yield, and the clergy were forbidden to dispense medicines. — Moreover there were already numerous court-apothecaries, and, what is more important, professors of pharmacy in France.

It was a general complaint that the apothecaries dabbled too much in the practice of the physicians, and, in regard to the prescriptions which they put up, that they did not watch scrupulously enough whether these were prescribed by persons authorized to write them. Hence arose frequent disputes between physicians and apothecaries (especially in the quarrelsome Faculty of Paris), in which the latter were finally in despair compelled to yield.

Many apothecaries were also capable chemists. Annual trips to Frankfort-on-the-Main, the commercial metropolis of Germany, were usually made for the purpose of purchasing drugs.

The age, however, was still very favorable for the apothecaries; for, while they were in the habit (as at the present day) of giving nothing to customers who were bad pay, on the other hand, their drugs often sold at fabulously high prices (which is not the case to-day), and money could be had for the veriest "filth", and even for excrement of all kinds. The latter was still to be found in the pharmacies during the eighteenth century, e. g. peacock's dung, cow-dung and cow's brain, horse's testicles, goat's penis etc. The so-called wolf's-heart (used in epilepsy), wolf's brain (in paralysis), genuine asinus, the curative virtue of which depended upon the fact that the withdrawal of J(esus) left sanus, all brought their price! The efficacy of varieties of dirt was considered demonstrated, among other reasons, by the circumstance that Christ healed the blind men with mud. The same thing was indicated by the sojourn of mankind in the womb for nine months between dung and urine, as well as by the fact that the cardinals seat the holy father upon a commode, to remind him of the humility so necessary to him, and St. Bernard called man a dung-sack etc.

The reading and writing of prescriptions too was no easy task in that day, for a great number of alchemistic and chemical signs and symbols existed for one and the same remedy. "Thus e. g. there were 19 different signs for sulphur, 21 for tin, 22 for cinnabar, 25 for subcarbonate of iron, sal ammoniac, saltpeter, 26 for alum, 28 for rock-salt, 29 for cooking salt, 31 for argol, 34 for gold, 35 for arsenic and borax, 36 for antimony, 39 for quicksilver etc. The symbol for gold was ⊙, that for silver ☽, for mercury ☿; in accordance with which the first was called sol, the second luna, the third Mercurius. Tin was called Jupiter, copper Venus, iron Mars" etc. (Marx.)

Grocers were also allowed to sell drugs, though in Frankfort-on-the-Main this concession was limited to quantities of not less than four ounces. They were, however, prohibited from selling composita, Frankfort pills and — adulterated articles! Traders (Kramer) and confectioners, who at this period also belonged in some sort to the pharmaceutical faculty, were equally prohibited from preparing and selling composita.

The veterinary faculty continued the same as in the preceding century. As an indemnification, however, for the subordinate, and often disreput-

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and in 1635:

A dose of pills for night for Mrs. Nicholas	1s.
A purge potion - - - - - -	3s. 6d.,
An emplaster for the neck - - -	1s. 6d.,
A preparative apozeme (decoction) - -	2s. 6d.,
A powder to fume the bedclothes - -	4s. (Richards.) (H.)

able, social position of its proper practitioners, it once more enjoyed in its department at least workers of high position and mostly of noble birth.

The subject of military hygiene also we find, on the whole, in the same condition as in the preceding century. The pictures of the sanitary condition of the armies during the Thirty Years' War are truly horrible. In the camps, as well as after the battles, the wounded and sick, in the lack of any regular care, perished miserably in crowds. Among the mercenary troops, as compared with the lansquenets, everything was much worse! In France, military hospitals and field pharmacies at least increased in number. There was still a "medicus" beside, and having control of, the surgical faculty — often only one for the entire army — and complete separation of the medical contingent, with all the disadvantages of this arrangement. The "Feldmedici" carried a baculus nodosus, after the style of the civil physicians, and always bore it with them as a symbol of their rank. The troops of the German empire present us with a field-physician (Feldmedicus) and a staff-surgeon (Stabschirurg) forming the chief authority, to whom the regimental surgeons (Regimentsfeldscheerer), with pay of 20 marks per month, and the company surgeons (Compagniefeldscheerer) were subordinate. Upon the staff of the artillery was placed a surgeon-major (Feldscheerermajor), whose pay was 28 marks per month, and who had his assistants (Gesellen). The subordinates were expected to report to the superior medical authorities daily, and every eight days there was a general report. A very bad picture was drawn of the character of the "Feldscheerer" of that day.

Pay of Military Physicians in Brandenburg during the 17th Century.

Years 1630–32,	Surgeon of the Lifeguard, monthly	22 M. 50 Pfg.
" 1635,	" " Company, "	14 M. 40 Pfg.
" 1638,	" " Regiment, "	30 M. — Pfg.
	The Surgeon	14 M. 40 Pfg.
" 1639,	Regimental surgeon (from scarcity of money), monthly,	15 M. — Pfg.
	Company surgeon of Cavalry, monthly,	11 M. 40 Pfg.
	" " Infantry, "	10 M. 80 Pfg.
From April 1655,	Regimental Wundarzt, Cavalry Staff, monthly	27 M. — Pfg.
	Regimental surgeon, Infantry Staff, "	27 M. — Pfg.
	Company surgeon of Cavalry, monthly.	27 M. — Pfg.
	Company surgeon of Infantry, "	15 M. — Pfg.
	In permanent camp and while resting in the country no pay was given from scarcity of money, but subsistence alone was furnished.	
From Dec. 1655	Wundarzt on the Cavalry Staff, monthly,	27 M. — Pfg.
	" " Infantry Staff, "	21 M. — Pfg.
	" of the Dragoons, "	21 M. — Pfg.
	" " Company of Cavalry, monthly,	21 M. — Pfg.
	" " " Infantry, "	15 M. 50 Pfg.

If forage and subsistence were furnished 9; 7.50; 6; 4.50.

THE GUARD.

	Surgeon of the Bodyguard,	monthly,	21 M. — Pfg.
Year 1676,	Surgeon of the Halberdier Bodyguard,	"	48 M. — Pfg.
" 1685,	The surgeon of a regiment,	"	52 M. 80 Pfg.
" 1635–85	Surgeon of the Grand-Mousquetairs, composed of French officers of the reformed faith, fugitives from their country,		90 M. — Pfg.
	Surgeon of the German Noble Guard, on the contrary, only		24 M. — Pfg.

In Prussia there were also higher Regiments- or Stabsfeldscheerer and Compagniefeldscheerer, who maltreated the soldiers when sick and shaved them (for the stipulated "Seifengroschen") twice a week when well.

The Great Elector (1620–1688) also appointed physicians and surgeons in garrison (Garnisonsmedici, Garnisonsfeldscheerer). The army of the Electorate of Saxony too, as early as 1613, had in each regiment of infantry eight Feldscheerer, whose pay was about 33 marks per month. They ranked between a quartermaster and a gunsmith. — In war one Medicus was allowed to 3000 men. Most of these Feldscheerer possessed no medical knowledge as to the treatment of the sick, but were "as well suited to such duty as an ass to dance." Yet even the "officers" preferred the Feldscheerer to the Medicus, although the former "prattled a heap of unprofitable boasting to the credulous patient and made him feel safe", and besides "treated, martyred, tortured or even killed in most barbarous style with indiscreet, highly injurious, dangerous and cruel poisons, such as bleeding, purging, cooling drinks, or all kinds of chemical and insufficiently tried medicaments." (Richter.) The soldiers generally relied mainly on the art of rendering themselves bullet-proof, on amulets etc., and placed no great confidence in the skill of the Feldscheerer. The cane too was still the instrument of correction for — all classes of military physicians, the Medicus not excepted. The regimental commander, and even lower military officials, prescribed both the place for its application (back, buttocks etc.), the method (switches etc.) and the number of blows.[1]

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[1] No standing army existed in England before the Restoration, and that of Charles II. scarcely exceeded 5,000 men. Hence our information as to the position and pay of medical officers in the English army at this period is very scanty. It is probable that before the Restoration such physicians and surgeons as were required for the emergency were either pressed into the service, or engaged for a definite period upon terms which varied in accordance with their position, reputation and other circumstances. Under the Commonwealth in 1650 it was ordered that a physician should be attached to the Northern Garrisons at a salary of 6s. 8d. per diem, and in the same year the Council of State resolved "that the Surgeons of each regiment of horse may have £10 apiece to furnish themselves with horses and furniture to carry their chests: and the same pay for each horse as private Troopers. Each Surgeon to have an additional sum of £5 for furnishing their chests with medicine, the present allowance being about £10 for each chest." In 1627 we read "The Master of the Company of Surgeons of London has imprested six of the Company to go down to Portsmouth. Some of them are to go to Portsmouth and some to Plymouth, to attend the wounded men from the expedition to Rhé." The pay of surgeons was apparently very small. In 1653 the Commissioners for sick and wounded "request the Admiralty Commissioners to

[Medical advertising seems to have been very well understood in England even at this early period, and Richards furnishes us with several pages of examples. From these I quote:

"THE SCOTCH PILLS.

Whereas Dr. Anderson or the Scotch Pills have been daily abused by dangerous counterfeits since the decease of Mrs. Katherine Anderson. These are to certifie for the Publick good, That the true Pill is faithfully prepared, and for the future to be sold with printed directions only by Mrs. Isabel Inglis, of Edinburgh, in Scotland, now living at the Hand and Pen, near the King's Bagnio, in Long Acre, and in no other place in or about the city of London."—London Gazette, 1689.

"OLD DR. MOSSE.

At the Golden Ball, in St. Jone's Court, near Clarkenwel lives Doctor Mosse, who hath Obtained the only most Sovereign and excellent Cure for the Gout, viz. A Balsam which in a moment's time takes away the Pain, be it never so exquisite and intolerable, strengthening and restoring the Joynts or Members Afflicted, to their perfect Vigour, Form and Motions, the said Balsam with a Box of Pills being the most Absolute Specificks for Curing and Defending both Internal and External Parts from that Miserable Distemper, ever yet published or made manifest by any."—Athenian Mercury, Nov. 3., 1694. (H.)]

[Medicine in the English Colonies of North America. Foundation of American Medicine.[1]

The seventeenth century is of peculiar interest to the American medical profession, as it witnessed the foundation and early struggles of what may, perhaps without presumption, be now called American Medicine.

The earliest medical practitioners in the American colonies were naturally the medical officers of the companies by whose direct agency these colonies were established, or the surgeons of emigrant and trading vessels which arrived at the new settlements. Thus Dr. Thomas Wootton, Surgeon-General of the London Company, accompanied the fleet under Captain Newport which founded at Jamestown, Virginia, May 13, 1607, the first permanent settlement within the limits of the present United States. In 1608 Dr. Walter Russell accompanied Capt. John Smith in his exploration of Chesapeake Bay and the Potomac river, and in the same year Anthony Bagnall was surgeon of the fort at Jamestown. Some idea of the novel circumstances under which medicine was practised in the infant colony at this period may be formed when we read that Dr. Woot-

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pay £8 1s. to Wm. Hayworth, surgeon, for 175 days' services with the sick and wounded at Ipswich, from June 10 to December 2." In the following year £16 14s., "being ten groats a day each", was paid to John Skinner and Robt. Seaman, Surgeons, of Harwich, for services from Aug. 7 to Sept. 26. (See Richards *passim.*) (H.)

[1] In the following section the translator takes pleasure in acknowledging his obligations to the writings of Drs. Joseph M. Toner of Washington, Stephen Wickes of Orange, New Jersey, Samuel Abbott Green of Boston and John R. Quinan of Baltimore.

ton was compelled to live for a considerable period upon crabs and sturgeon from the James river, and that surgeon Bagnall, on one of his professional visits, received an Indian arrow through his hat. The sojourn of all these medical men in the new colony seems, however, to have been quite transient, for in the following year Capt. Smith, who had been accidentally wounded, was compelled to return to England for treatment, "for their was neither chirurgeon nor chirurgery at the fort." In 1610, however, Dr. Lawrence Bohun, an alumnus of one of the universities of the Netherlands, arrived in Virginia, and in the following year is mentioned as the Physician-General of the colony. The illness of Lord Delaware, who was compelled to sail to the West Indies for his health, withdrew Dr. Bohun from the infant settlement in the same year, and he was soon after killed in an engagement with a Spanish man-of-war. The position of Physician-General, thus vacated, was soon after filled by the arrival of Dr. John Pot, who became a permanent settler of the new colony, and thus enjoys the honor of having been the first permanent resident physician in the United States. Dr. Pot seems to have been a man of very considerable merit, as he was elected temporary governor of Virginia in 1628.

On Sept. 3, 1609, Henry Hudson in the "Half Moon" first cast anchor in the waters of New York Bay. It was not, however, until 1623 that any serious effort was made to colonize New Netherlands, as the new colony was called, and in 1626 Peter Minuit, the new Director-General, purchased the island of Manhattan from its aboriginal proprietors for the sum of about $24. The germ of our present commercial metropolis at this period consisted of thirty houses, and its population in 1628 numbered 270 souls, "including Dutch, Walloons and slaves from Angola."

The earliest physicians whose names are mentioned in connection with the colony of New Netherlands are Hermann Mynderts van de Bogaerdet, surgeon of the ship Endragh, trading with the colony in 1631, and William Deeping, chirurgeon to the ship William of London, in 1633. In 1637, however, arrived the first permanent medical settler in the city of New Amsterdam of whom we have any record. This was Dr. Johannes La Montagne, a Huguenot physician, whose ability soon rendered him a prominent man, both professionally and politically, in the new colony. In 1638 Wilhelm Kieft, the new Director-General of the colony of New Netherlands, arrived in New Amsterdam, bringing in his train two surgeons, Gerrit Schult and Hans Kiersted. The latter married a daughter of Dr. La Montagne, and was a popular practitioner in the colony at least as late as 1661. Other prominent medical practitioners in the colony of New Netherlands were: Dr. Abraham Staats, a native of Holland, settled at Fort Orange (now Albany) prior to 1650, whose house at Claverack was burned by the Indians in 1664, his wife and two sons perishing in the flames; Drs. Jacob Hendrickson Varvanger, Jacob L'Orange, Jacob D. Commer, J. Hughes, Jan du Parck, Alexander C. Curtis, Peter Jansen van den Bergh, Hermann Wessels, Gysbert van Imbroeck (another son-in-law of Dr. La Montagne), who practised at Wiltwyck, and others.

Among the forty-one "Pilgrim Fathers", who with their families constituted the 102 emigrants of the "Mayflower" and founded the colony at Plymouth in 1620, was Dr. Samuel Fuller, the first physician of New England. He continued in active practice among the colonists, and was held in the highest esteem both as a man and a physician until in 1633 he fell a victim to his professional zeal. Other reputable physicians of Massachusetts during the 17th century were: Dr. Giles Firman (1634) and Dr. William Gager (1630) of Boston; Dr. John Fisk (1637) of Salem; Dr. Comfort Starr (1637) of Cambridge, subsequently of Boston; Dr. Matthew Fuller (1640) of Plymouth; Dr. Thomas Oliver (1640) of Boston; and the surgeons Thomas Starrs (1640) of Yarmouth and Samuel Seabury (died 1680) of Duxbury.

It would of course be both useless and wearisome to enumerate in detail the names of all the early medical men of the numerous settlements established in the United States during the 17th century. Sufficient has been said to show that the early colonists were by no means deprived of medical assistance in the various diseases with which the infant settlements were speedily visited.

Nor is it to be hastily assumed that the medical pioneers of this country were men lacking in either personal character or professional ability. It cannot of course be expected that eminent European practitioners and teachers would abandon the comforts, honors and privileges of European civilization for the poverty and hardships of a pioneer's life. But it may be safely asserted that the early medical settlers of the American colonies were the peers of the average European physician of their day. Dr. Pot, as we have seen, became governor of Virginia; Dr. La Montagne was a member (and the only one) of Kieft's council, and filled with honor other positions of trust; John Winthrop Jr. (1606–1676), an alumnus of Dublin and an able physician,[1] was the first governor of Connecticut and one of the founders of the Royal Society of England, to which he found leisure to transmit several communications; Dr. Matthew Fuller of Barnstable was Surgeon-General of the provincial forces in 1673, and we shall have occasion to mention others who became eminent in various fields of activity during the 17th century.

The sources of supply for the medical profession of the growing colonies were twofold, foreign and domestic. During the course of the 17th century numerous educated European physicians emigrated to America and cast their lot with the hardy founders of western civilization. Besides those already noticed, we may mention Dr. John Clark of Boston (1638), whose son and grandson of the same name were eminent members of the medical profession, and whose portrait is now in the possession of the Massachusetts Historical Society; Dr. Robert Child, an alumnus of Padua, who settled in Hingham as early as 1644 and was described by Gov. Winthrop as "a man of quality, a gentleman and a scholar"; Dr. Thomas Thacher, a minister and physician who came to New England as early as 1635, and was the author of the earliest contribution to medical literature in America; Dr. Johannes Kerfbyle, a native of Holland and an alumnus of Leyden, who practised in New York, and in 1691 made one of the earliest autopsies recorded in this country; Dr. Abraham Peirson, an alumnus of Cambridge, who immigrated to Boston in 1639 and was one of the earliest physicians of New Jersey, where he removed in 1667; and many others.

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[1] The senior John Winthrop (1587–1649), Governor of Massachusetts, though a lawyer by profession, is said to have also possessed considerable medical skill, and was in the habit of distributing charitably the remedies of Van Helmont.

Of the indigenous practitioners of medicine in the colonies, a certain number, after acquiring at home such preliminary education as the country afforded, went to Europe for the purpose of studying medicine in the European universities. The most popular of these among American students were those of Leyden Oxford, Cambridge, Aberdeen, Paris and Padua. That the American colonists were by no means insensible to the advantages of education is manifest from the fact that, at the very first colonial assembly held in Virginia in 1619, measures were adopted looking "toward the erecting of a university or college". In New England too, in 1642 a law was passed requiring "that none of the brethren shall suffer so much barbarism in their families as not to teach their children and apprentices so much learning as may enable them perfectly to read the English tongue", and in 1647, "To the end that learning may not be buried in the graves of our fore-fathers", it was ordered in all the Puritan colonies "that every township, after the Lord hath increased them to the number of fifty house-holders, shall appoint one to teach all children to read and write; and where any town shall increase to the number of one hundred families, they shall set up a grammar school, the masters thereof being able to instruct youth so far as they may be fitted for the university." A public school had been already established by the general court at Cambridge in 1637, and when in 1638 Rev. John Harvard bequeathed to it his library and one half his fortune, it was christened Harvard College. The educational efforts of the Virginia colonists, however, bore no permanent and important fruits until about half a century later, when William and Mary College was chartered in 1693. Harvard College has thus the honor of being the earliest institution for higher education established in the United States, and the earliest but one in the western hemisphere.[1] Nor were the colonists indifferent to the cause of special medical education. As early as 1629 the Governor and Deputy of the New England Company sent to Governor Endicott a "Chirurgion", Lambert Wilson, who was to continue in the service of the colony for three years, and in their letter of instruction they provide further: "And moreover hee is to educate & instruct in his Art one or more youths, such as you and the said Councell shal appoint that may bee helpfull to him, and if occasion serve, succeed him in the Plantacion, wch youth or youths fitt to learn that profession lett bee placed wth him etc." In 1647 John Eliot, the "Apostle to the Indians", writes to the minister of Cambridge, expressing the desire that:

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[1] The University of San Marcos at Lima in Peru is said to have been chartered by the Emperor Charles V. in 1551.

> "Our young Students in Physick may be trained up better than yet they bee, who have onely theoreticall knowledge, and are forced to fall to practise before ever they saw an Anatomy made, or duely trained up in making experiments, for we never had but one Anatomy in the Countrey which Mr Giles Firman (now in England) did make and read upon very well" etc.

In the same year the General Court published the following recommendation:

> "We conceive it very necessary yt such as studies physick or chirurgery may have liberty to reade anotomy & to anotomize once in foure yeares some malefactor, in case there be such as the Courte shall alow of."

It is not improbable that the anatomical lectures of Giles Firman, which were delivered prior to 1647 and are the earliest example of public medical instruction in the United States, were given at Harvard College. At all events Edward Johnson, in his "Wonder-Working Providence" published at London in 1654, speaking of this college says: "some help hath been had from hence in the study of Physick", and the majority of early colonial students, who went abroad to receive their medical education, had already taken a more or less complete course at Harvard College. Among the latter we may mention Samuel Bellingham and Henry Saltonstall, graduates of Harvard at her first commencement in 1642; Leonard Hoar, an alumnus of Harvard in 1650 and president of the college in 1672; John Glover (Harvard, 1650), who studied medicine at the university of Aberdeen and settled in Roxbury; John Rogers (Harvard, 1649), who, however, was chiefly active as a minister, and was also president of Harvard College from 1682 to 1684; Samuel Megapolensis (Harvard, 1661 ?), who studied both theology and medicine at the university of Utrecht and settled in New Amsterdam.

By far the larger number of domestic physicians, however, were compelled to depend for their education upon the very defective educational arrangements of the colonies themselves. The vast majority of medical students, without any pretence of preliminary education, at the age of 14–18 years entered the office of some medical practitioner in their vicinity, under indentures of apprenticeship for the term of 3–7 years. In this position they had access to their master's very limited library,[1] and learned to pulverize drugs, prepare ointments, plasters, tinctures etc., to extract teeth, cup and perform venesection and many of the operations of minor surgery. In addition they were expected to discharge the menial duties of sweeping out the "office", caring for their master's horse, keeping in order his limited stock of instruments etc. As the student advanced in years and instruction he accompanied his master to the bedside of his patients and listened to the words of wisdom which fell from his lips, or even attended himself to night-calls and less important cases. Possibly a happy accident might supply him with a human limb for the study of practical anatomy, but this was a contingency far too rare to be of any practical benefit. At the expiration of his term of apprenticeship the newly fledged "physitian",[1] with no further evidence of a medical education than perhaps the certificate of his preceptor, plunged at once into the duties of his profession, and relied upon his own skill and energy for his future success.

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[1] An inventory of the effects of Dr. John Clark, who died in Boston in 1664, values his "books and instruments, with several chirurgery materials in the closet, £60; medicines and drugs, £10; and a pocket watch, £3." The library of Dr. Matthew Fuller, Surgeon-General of the provincial forces in 1673, was valued, in an inventory of his effects, at £10; his surgeon's chest and drugs at £16. This was probably

The practical results of such a system of education must, of course, have depended largely upon the capacity of the master and the aptitude of the student. At best they could be only very imperfect. Doubtless, in very many cases the so-called education was little more than a farce. Yet it is not to be inferred that *all* students of this system were ignorant and incapable practitioners. Native talent and industry often make large amends for defective education, and many of these apprentices doubtless proved as successful physicians (and success is our usual test of merit) as some of their more fortunate colleagues who boasted an M. D. of Leyden, Aberdeen or Cambridge and slew their patients *secundum artem*. We may fairly infer that the vile decoctions of domestic roots and herbs and the "Indian cures" of these indigenous practitioners were quite as useful as, and far less dangerous than, the

"Clysterium donare,
Postea seignare,
Ensuita purgare"

of the "regular" Faculty. By the latter, however, these domestic physicians were naturally looked down upon with scorn and contempt, and re-

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considerably above the average. The inventory of Samuel Seabury, a surgeon of Duxbury who died in 1640, gives the items of his library as follows:

Nicholas Culpepper's Practice of Physic	£1	4s.	0d.
Ditto Anatomy		3s.	—
Reed's Practice of Surgery		1s.	6d.
Physician's Practice		1s.	
Latin Herbal	£1	10s.	—
Art of Distillation, by John French		2s.	—
	£3	1s.	6d.

The "surgeon's instruments" of the same surgeon were valued at 12s., and an "Antimonial cup" (?), at 5s.

[1] According to Toner the term "Doctor" was not applied to practitioners of medicine in the colonies until about 1769.

garded as mere "quacks". This will, perhaps, account, at least partially, for the unfavorable picture of medical affairs in the colonies drawn by contemporary writers, most of whom were "regular", i. e. regularly educated physicians, or other persons whose own educational advantages led them, possibly, to undervalue the practical ability of their less fortunate colleagues and colonists.[1] Fortunately too the sturdy constitutions of the early settlers proved often more than a match for the ignorance and incompetence of their medical advisers, and beneficent Nature made ample amends for the deficiencies of art.

The conditions of practice in the new colonies too differed *toto cœlo* from those which prevailed in the Old World. The physician, with a scanty and defective stock of drugs and a still less complete armamentarium of instruments, was called, perhaps at midnight, to ride many miles through an almost pathless forest, and to treat not only cases of disease, but fractures, dislocations, arrow-wounds, gun-shot wounds and all the accidents incident to frontier life. Hence he was required to be above all a ready man, willing and able to render prompt assistance in all sorts of emergencies. In the lack of regular medicine he was often compelled to experiment with, and to rely upon, indigenous remedies, and to devise surgical apparatus of the homeliest pattern. All this stimulated that tendency to "practical" objects, which has become in recent times the chief glory of American Medicine.

According to Wickes, "An act for regulating the fees and Accounts of the Practicers of Phisic", passed by the Assembly of Virginia in the year 1636, provided that "Surgeons and Apothecaries, who have served an apprenticeship to those trades", should be permitted to charge five shillings for each visit and prescription in town, or within the distance of five miles thereof. On the other hand, "to those persons who have studied physic in any university, and taken any degree therein", it was permitted to charge ten shillings for the same service. These were about the same fees allowed in the mother country at the same period. Medical fees, however, were largely (often entirely) paid in articles of barter, e. g. corn, tobacco, wampum, skins, powder and lead etc. The same is true of the salaries of ministers and teachers. Bancroft says "once at least every family in each of the colonies gave to the college at Cambridge (Harvard) twelvepence, or a peck of corn, or its value in unadulterated wampum peag; while the magistrates and wealthier men were profuse in their liberality." In New England the ordinary medium of exchange was corn; in the southern colonies, tobacco. Indeed, as we know, the price of a wife in Virginia about 1620 was 120–150 pounds of tobacco. Besides this, medical fees were then (as now) proverbially uncertain. Hence it was very common for one person to fulfill the functions of minister and physician, or even minister, physician and teacher, in order to gain a more certain support by a multiplicity of employments. The combination of minister and physician was especially frequent in New England, where many of the clergy, in anticipation of their future experience, had studied medicine as well as theology, in order to be prepared to administer to the physical as well as spiritual needs of their fellow-colonists. Thus several of the physicians already mentioned were also highly esteemed as ministers, e. g. Dr. John Fisk, who was also a teacher, Leonard Hoar, Isaac Chancy, John Rogers and others. In New Netherlands the same arrangement seems to have prevailed to some extent, though in the more southern colonies it was less common. The reason of its special frequency in New England is, doubtless, to be found in the intense religious feeling which prompted the foundation of those colonies, and pervaded all their social and political institutions.

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[1] Certainly it would have been impossible to rival in the American colonies any such catalogue of irregular practitioners as adorns (?) page 552 of the present work.

Of medical literature in the colonies during the 17th century we can scarcely speak. The first printing-press was introduced at Cambridge in 1639, and in the same year appeared the "Freeman's Oath" and "An Almanack". In 1640 was published "for the comfort and edification of the saints" a rude translation of the Psalms of David in metre, a volume of 300 octavo pages — the first book issued from the American press north of the City of Mexico. Eliot's Indian Bible appeared in 1660–63. Presses were established at Boston in 1674, Williamsburg, Va., 1681, Philadelphia, about 1685, and in New York in 1693. — The earliest newspaper was the "Publick Occurrences" of Benj. Harris, the first and only number of which appeared at Boston Sept. 25, 1690. No permanent journal, however, was published in the colonies until the appearance of the "Boston News Letter", April 24, 1704. This journal survived for 72 years, in spite of the fact that for the first fifteen years of its existence its subscription list did not exceed 300.

The only medical publication of the colonies during the 17th century was the "Brief Rule to Guide the Common People of New England how to Order themselves and theirs in the Small Pocks or Measels", printed and sold by John Foster, Boston, 1677. This pioneer of the overwhelming medical literature of the United States in the 19th century was printed upon one side of a single sheet of paper 15½ by 10¼ inches in size, in double columns like a modern poster, and was the work of Dr. Thomas Thacher of Boston. Dr. Thacher was born in England May 1, 1620, and received at home merely an ordinary school education. Declining to visit Oxford or Cambridge, as his father desired, he emigrated to New England in 1635, and soon after placed himself under the instruction of Dr. Charles Chauncey, who in 1654 was appointed president of Harvard College. Under the guidance of this eminent scholar Dr. Thacher acquired considerable knowledge of Hebrew and Arabic, with the excellent medical principles which in after life he found occasion to employ in practice. In 1644 he was ordained pastor of the church in Weymouth, but removed in 1669 to

Boston, where he assumed the pastoral charge of the "Old South Church" and devoted much of his time to the practice of medicine. In the latter sphere he is said to have enjoyed considerable reputation. Dr. Thacher died in Boston October 15, 1678. Of his writings, besides the "Brief Rule", a Hebrew lexicon and a catechism are said to have been printed, each, however, occupying only a single sheet of paper.

The "Brief Rule" declares small-pox and measles diseases of the blood "endeavoring to recover a new form and state. This nature attempts 1. By Separation of the impure from the pure, thrusting it out from the Veins to the Flesh. 2. By driving out the impure from the Flesh to the Skin." The first separation takes place in the first four days "by a Feaverish boyling (Ebullition) of the Blood": the second separation occupies the remaining period of the disease. Dr. Thacher's treatment is very judicious and evidently modelled upon that of Sydenham. Before the fourth day he would administer no medicine, and he cautions particularly against a heating regimen, "Cordials, as Diascordium, Gascons powder and such like". He would have the patient abstain from meat, wine and open air, use "small Beer warmed with Tost" for drink, and water-gruel, water-pottage and the like for food. The room should be kept comfortably cool, and the bed-clothing should be light. After the fourth day "warm milk (not hot) a little dy'd with Saffron may be given morning and evening till the Pustules are come to their due greatness and ripeness." When the pustules begin to dry "four or five spoonfuls of Malago wine tinged with a little Saffron" may be administered night and morning. The symptoms of the stage of invasion are well described, and the evil omen of an imperfect or delayed eruption, black, "blewish" or green pustules, diarrhœa, hæmaturia and hæmorrhages generally, is carefully recorded. On the whole the paper does credit to both the head and heart of the worthy and reverend doctor, though certain sections are almost literal translations of Sydenham. He could scarcely select a better model!

During the early years of the colonies the European distinction between physician and surgeon was still partially preserved, especially in the larger towns and among medical practitioners of foreign education. But the exigencies of the new surroundings soon put an end to such distinctions in the colonies, and the vast majority of medical men practised indiscriminately medicine and surgery, as they do in the United States to-day.

The chronic and hereditary quarrel between barbers and surgeons crops out once more in the following ordinance adopted by the Dutch authorities of New Amsterdam in 1652:

"On the petition of the chirurgeons of New Amsterdam, that none but they alone be allowed to shave; the director and council understand that shaving doth not appertain exclusively to chirurgery, but is an appendix thereunto; that no man can be prevented operating on himself, nor to do another the friendly act, provided it be through courtesy and not for gain, which is hereby forbidden. It was then further ordered that ship-barbers shall not be allowed to dress any wounds nor administer any potions on shore without the previous knowledge and special consent of the petitioners, or at least of Doctor La Montagne." — (Med. Register N. Y. City, 1865.)

Apothecaries also existed in the larger towns, some of whom also practised medicine as in England. But physicians, as a rule, kept and prepared their own drugs.

Midwifery, as in Europe, remained in the hands of women, physicians being called in only in difficult and protracted cases. Even the names of some of the early midwives of New England have been preserved to us, and among these we may mention the wife of Dr. Samuel Fuller, one of the pilgrims of the Mayflower; Mrs. Hutchinson of Boston (1637), who was, however, banished from the colony for her political heresies, and Ruth Barnaby, likewise of Boston, who died in 1765 at the advanced age of 101 years. It is very doubtful whether any of these women had received any special education for the performance of their duties, personal experience of maternity being considered then (as it generally is now) amply sufficient to qualify them for their office. Even female physicians were not unknown. The first person executed in the colony of Massachusetts Bay was Margaret Jones, a female physician accused of witchcraft, "malignant touch" etc.

Daniel Porter was a celebrated "bone-setter" in Connecticut about 1670, who seems to have occupied some public position, for his "salary" was raised in the year mentioned, on the implied condition that he should "instruct some meet person in the art for which he was so distinguished."

It is worthy of remark, amid the wholesale charges of quackery in the American colonies at this period, that we read nothing of those itinerant lithotomists, herniotomists and oculists, who found in Europe so fertile a field for their activity. Probably the hardships of colonial life presented no attractions to such gentry, whose sole object was money, and to whose success an extensive clientèle was necessary.

It redounds too to the credit of the physicians of New England that their names are conspicuously absent in the scandalous history of the delusion known as the "Salem Witchcraft", which ran its brief career in 1692, and in which Cotton Mather and Samuel Parris, both ministers, the one an alumnus, and the other a student, of Harvard College, played so melancholy a rôle.

In the province of state medicine we read that Henry Taylor, a surgeon of Boston, had his taxes remitted in 1669, in consideration of his agreement to attend the sick poor, and in 1671 Dr. Samuel Stone agreed to attend "the town's poor for twenty shillings in money and a remittance of taxes." The earliest hospital within the limits of the United States was probably erected in New York between 1650 and 1680, for in the latter year the governor sold an institution known as the "Old Hospital or the Five Houses" for the sum of £200, its place having been taken by better and more serviceable buildings. In times of epidemics the sick were usually placed in "pest houses" on the outskirts of the town, and cared for by their friends or by hired attendants.

A writ *de ventre inspiciendo*, authorizing a jury of matrons to decide whether one Judith Catchpole, accused of infanticide, had been pregnant, is recorded in Maryland in 1656. The earliest autopsy and verdict of a coroner's jury of which I have been able to find any record occurred also in Maryland in 1657. The subject of the autopsy was a negro, Henry

Gouge, who it was suspected had met foul play at the hands of his master. The court ordered Mr. James Veitch, with two chirurgeons, Mr. Rd. Maddocks and Mr. Emperor Smith, and as many neighbors as could be conveniently procured, to investigate the case. The report of this jury was rendered to the court Sept. 24, 1657, and its Dogberry style is worth quotation. It runs as follows:

> " Whereas, according to the order of the court, we have proceeded and diligently viewed the head of the corps of Henry Gougue and laid open to us by the chirurgeons, which was ordered by the court to view and lay open to us:
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> "We detest under our hands that we can see nor find nothing about the said head, but only two places of the skin and flesh broke on the right side of the head, and the scull perfect and sound and not anything can or doth appear to us to be any cause of the death of the said Gouge, and also we do detest that we did endeavor, what possible in us lay, to search the body of said corps and could not possibly do it, it being too noysome to us all and being put at first into the ground without anything about it, as the chirurgeons and the sheriff can satisfie you, this is the truth and nothing but the truth, as witness our hands and seals this 24 day Sept. 1657. And according to the order we have delivered the said head in the hands of the sheriff."

The head of the corpse was brought into court for inspection, and several of the witnesses at the trial deposed that "the corps bled afresh when Dandy (the master) touched it."

The surgeons were allowed by the court one hogshead of tobacco as their fees for "dissecting and viewing the corps".

Other early autopsies are recorded in Maryland in 1670, Massachusetts 1674 and New York 1691. The last-mentioned was performed by Dr. Johannes Kerfbyle and five other physicians upon the body of Gov. Sloughter of New York, who had died suddenly under circumstances suggesting the suspicion of poisoning.

Coroners were appointed for each county of Maryland in 1666.

Medical legislation in the colonies during the 17th century was largely devoted to the regulation of medical fees, which seem to have been frequently regarded as exorbitant. The earliest law relating to medicine of which I find any record was passed by the Assembly of Maryland in 1638, and was entitled "An Act for settling artificers' wages". It authorized the county courts "to moderate the bills, wages and rate of artificers, laborers and Chirurgeons, according to the most recent rate of tobacco, proportioned to the rate of the price of the same, or the like art, labour or workmanship in England." In 1639 the Assembly of Virginia passed an act providing "that it should be lawful and free for any person or persons in such cases where they should conceive the acco't of the physitian or chirurgeon to be unreasonable, either for his pains or for his druggs or medicines, to arrest the said physitian or chirurgeon either to the quarter court or county-court where they inhabitt, where the said phisitian should declare upon oath the true value, worth and quantity of his druggs and medicines administered to or for the use of the plt. (patient), whereupon the court where the matter was tryed was to adjudge and allow to the said phisitian or chirurgeon such satisfaction and reward as they in their discretions should think fitt." The earliest attempt, however, to regulate the practice of medicine in the colonies of which I find any record is the law of Massachusetts passed in 1649. This runs as follows:

> "Chirurgions, Midwives, Physitians. —Forasmuch as the law of God allowes no man to impaire the life or limbs of any person, but in a judicial way: It is therefore ordered, That no person or persons whatsoever imployed at any time about the bodyes of men, women or children for preservation of life or health as chirurgions, midwives, physitians, or others, presume to exercise or put forth any act contrary to the known, approved Rules of Art in each Mystery and occupation, nor exercise any force, violence or cruelty upon or towards the body of any, whether young or old (no not in the most difficult and desperate cases) without the advice and consent of such as are skillfull in the same art (if such may be had), or at least of some of the wisest and gravest then present, and consent of the patient or patients if they be mentis compotes, much less contrary to such advice and consent, upon such severe punishment as the nature of the fact may deserve; which law, neverthelcss, is not intended to discourage any from all lawfull use of their skill, but rather to encourage and direct them in the right use thereof, and inhibit and restreine the presumptuous arrogancy of such as through presidence of their own skill, or any other sinister respects, dare boldly attempt to exercise any violence upon or towards the bodyes of young or old, one or other, to the prejudice or hazard of life or limbe of man woman or child."

This law was substantially adopted in New York in the Duke of York's grant of 1665. In the city of New Amsterdam an ordinance was adopted by the "schout, burgomaster and schepens" in 1657 giving notice "To all chirurgeons of the city that when they are called to dress a wound, they shall ask the patient who wounded him, and that information thereof be given to the schout." An act "to better prevent the spreading of infectious sickness" was also adopted in Massachusetts in 1699.

Syphilis is said to have made its first appearance in Boston in 1646, and was such a novelty to both physicians and laity that no one succeeded in curing the patient until a young surgeon, who was familiar with the disease, arrived in port from the West Indies!

Epidemic diseases of greater or less extent and severity afflicted the colonists frequently during the 17th century. Small-pox was especially frequent in New England, and is said to have ravaged the Indian tribes of this vicinity in 1618, two years before the arrival of the "Pilgrims".

According to Toner it prevailed as a general epidemic in New England in 1618, 1622, 1638; in Salem, 1633; Boston, 1631, 1633, 1639, 1645, 1647, 1649, 1666, 1677–8, 1689; in Pennsylvania 1661, 1663 and in Charleston, S. C., 1699.

Yellow fever first appeared in New York in 1668. It prevailed at Boston in 1691 and 1693; and in Philadelphia and Charleston, S. C., 1699. Influenza appeared in Massachusetts in 1647 and 1655, and, according to Jacobi, diphtheria occurred in Roxbury, Mass., as early as 1659. (H.)]

THE EIGHTEENTH CENTURY

is, in every point of view, one of the most important in both the history of culture in general, and in that of the sciences in particular.

If the 16th century was the age of reforming Idealism directed against mediæval faith and thought, an Idealism for which the 15th century had prepared the way, and if the 17th was the epoch of realistic reaction against this latter movement, which expressed itself in the departments of state and church by a struggle concerning the real authority and power, and in the special department of medical science by the domination of the inductive philosophy, which had been introduced and at once put in practice; so the 18th century, in its most conspicuous phenomena, showed itself again a continuation of the idealistic tendency of the 16th, save that in Germany the 18th century forced into a richer and more luxuriant bloom the intellectual seed of the 16th. The Idealism of the 18th century was no longer, however, humanistic and reformative, but avowedly humanitarian and revolutionary. From this revolutionary Idealism sprung, and to it corresponded, that stormy realization of conclusions, whose mightiest development in the department of politics may be considered the American revolution and the French revolution of 1789 (whose guiding ideas were based upon the former), with their interpretation, and their attempted attainment, of the so-called rights of man.[1] In the department of letters, on the other hand, this Idealism expressed itself in the boldest criticism and transformation of almost all the sciences, and in art, by the establishment of new and renovated principles. A necessary result of this too was the cosmopolitism of the last century.

The 18th century by this tendency released the masses, in theory, though not actually, from the bonds which had hitherto confined them on all sides and in all departments, and established the principles of independence, the free right of development and the equality of all before the law — principles diametrically opposed to the existence of castes, heretofore so flourishing, to the "privileges" of cities and of corporations and to the absolutism of sovereigns. The first three of these it swept away. Philosophers created the new political and social doctrines, and never, even in Greece, had they so great and so immediate an influence upon the life of their age as in the 18th century. We need recall only the effects of the teachings of a Montesquieu, a Turgot and a Rousseau, the latter of whom awakened a revolution in politics and education. Sovereigns too, like Joseph II., even a Catharine II., were their followers, and became idealistic revolutionists; indeed, prelates and priests embraced their doctrines.

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[1] It is very interesting to note that the doctrine of popular sovereignty was set forth in modern times by the Council of Trent, or rather by the Jesuits (Jacob Lainesz, Bellarmin), and first introduced into practical life by the Netherlanders (Häusser). Accordingly neither the Americans nor the French were really the authors of the doctrine of the rights of man, but the Jesuits, though of course the latter acted in the interest of the papacy, not of the people.

Even skeptics and materialists strove for the ideal aim of general "enlightenment", and became, as we know, the proper authors of the great revolution, and thus of the social regeneration of the so-called third estate.

Enlightenment was certainly necessary! For example, a passage in the commission of the vice-president of the Berlin academy in the year 1732 ran: "since there is a standing tradition that considerable treasures lie buried in the electorate particularly in the neighborhood of Leubus, Lehnau and Visneck, and certain monks Jesuits and such vermin (the Jesuits were so hated in the 18th century that they were banished even from Catholic states) and offal from Rome come to search for them, and to know whether they really exist, the vice-president must keep a careful eye on this pack of priests, and trace out the treasures by means of charms, witches and divining-rods, for which purpose the magic books, like the Speculum Salomonis, shall be sent to him from our archives!" And when in 1740 the "Judengasse" in Frankfort-on-the-Main was entirely burnt up, the fire was quite generally ascribed to the circumstance that a Rabbi, while imparting some cabalistic instruction, had set fire to a pile of wood for experimental purpose in his house, and then, by an *oversight*, had invoked the spirits of fire instead of those of water. The physician Senckenberg, indeed, make great sport of this superstition, though he himself was by no means exempt from superstitious ideas. In 1742 the administration recommended the preservation of the wooden trenchers which were inscribed on Friday, that they might be cast into the fire in the name of God during conflagrations, in order to deaden the flames. The pest-ordinance of Prussia in 1709 declared the plague a just punishment for past sins, and ordered fasts, penitential days and days of prayer, as well as daily prayers in the churches, to combat it.

But for this purpose the overthrow of existing institutions was necessary, especially in our own land, where the worst effects of the so-called Middle Ages, as well as of the Thirty Years' War and the wars of Louis XIV — poverty and the exaggerated influence of the noble, as contrasted with the citizen, element, together with the ascendancy of France and her morals — made themselves felt.

Among the so-called highest and higher classes, especially in France, extravagance and immorality generally prevailed. The peasant and the citizen, on the other hand, paid taxes, labored and suffered want, if (as was not rarely the case) they did not actually starve. In Germany the majority of the innumerable potentates were spoilers of the people, and some even sold their subjects. Thus Hesse-Cassel sold to the English 16,992 men,[1] Brunswick 5,723, Hesse-Hanau 2,422, Anspach 1,644 etc.' Life and education were thoroughly un-German. The higher classes of society aped the French, who in hordes still afflicted the land like parasites, especially at the numerous greater and lesser courts of the princes, where even a Casanova[2] became possible. They spoke French, and even Frederick II—a fault which history will ever emphasize more strongly — wrote too in French, despised Lessing, called the Nibelungen paltry trash etc. National feeling was almost everywhere lost. Petty sectional politics (Kirchthurmpolitik) were generally in vogue, and Frederick II.

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1. Many of these mercenary troops were, as we know, employed by the British government in their effort to subjugate the American colonies, and their numerous atrocities awakened in the hearts of our Revolutionary sires a hatred and an abhorrence which has descended to us in the vituperative epithet "Hessian", that is mercenary cut-throat. (H.)
2. Giovanni Giacomo Casanova de Seingalt (1725-1798), an Italian adventurer, who was a familiar character at many European courts during the last half of the 18th century. He left some autobiographic memoirs, published in 1822. (H.)

again, in contrast to a portion of his predecessors, considered everything not Prussian to be foreign. Emperor and empire were obsolete ideas. Almost every "sovereign" — in the beginning of the 18th century there were still about 1800 of them — celebrated his expensive and demoralizing gala-days, had his Versailles, and, where possible, his Sèvres, incurred expenses and built magnificent edifices, totally disproportioned to the size of his petty kingdom and not infrequently, out of pure caprice, misplaced these palaces in barren and waterless districts, and yet surrounded them with pleasure-grounds, which were then supplied à la Versailles with water brought from a remote region by water-works etc., etc. Mistresses too squandered and devoured the blood-money of the peasant at many (even spiritual) courts, so that what little prosperity the ravages of the preceding wars had spared, for the most part fell a sacrifice to the frivolous practices of princes and noble priests and lords. Almost every hamlet had its feudal lord, frequently several of them, in which event the process of extortion was practised by each in turn. Yet scarcely one of these village tyrants could read. The conceptions of justice and the barbarity of its administration are best illustrated by the fact that the newly published Constitutio criminalis Theresiana of 1769 contained 17 copperplate engravings to supply the necessary illustrations of the various modes of torture, e. g. how the axillary cavity should be burned with eight tallow-candles tied together etc. Of course a "Torturarzt" was always present, to watch how far the torture could safely proceed — certainly a "humane" occupation. Frederick II. and Joseph II. were the first to reform this matter. Yet the Constitutio Carolina has been enforced frequently even down into the present century, so that it was not until 1869 that torture was last practised in the Swiss canton of Zug.

In the presence of such lavish expenditure of the products of the labor of the common people, of course nothing, or next to nothing, remained for the social elevation, and the improvement of the education, of the masses. Commercial restrictions worthy of the negro potentates of Africa restrained commerce of all kinds, and principles such as were laid down by Adam Smith (died 1790) in his "Wealth of Nations" (1776) remained without results in his own day. Scarcely anywhere could anything classical be found in the life of the people; rather wanton barbarity, poverty, filthiness and rudeness prevailed almost universally. Famines were not unusual in some countries, for agriculture too was in a condition of depression, and a grain-trade was scarcely possible. Turgot estimated the entire international grain-trade at only 11 millions of hectolitres (to-day it is over 200 millions). The consequences were the plague and famine-typhus, direct results of bad political-economy. The free cities alone formed an exception to the rule, for in their citizen class, under the influence of greater freedom and self-government, morality, education and prosperity had preserved a place of refuge and flourished. Money to build roads, to pave streets etc. was wanting, so that intercourse was burdened with endless difficulties, and almost every journey was at the risk of one's life — a condition which Haller, Zimmermann, Göthe and others have well described. Popular education and similar luxuries stood entirely in the background. Indeed the children of peasants, many of whom were still bondmen, could never acquire a higher education,[3] even if they had had a desire, and plenty of money, to do so. This right (in spite of innumerable special privileges) was denied to them in a few petty states even as late as the first quarter of the present century. In fact men, even whole regiments of them, were sold, as already remarked, to foreign belligerents and in remote parts of the world, an indelible disgrace which burdens none of the princes of other people. Nothing but the

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3. Even as late as 1831 a peasant's son in the electorate of Hesse was required to petition for permission to study at a university.

long-suffering and deeply religious bent of the German character permitted the poor creatures to bear their crushing yoke and their misery which not infrequently sunk into actual starvation, without making a bloody effort at defence.

No wonder too that the French Revolution was hailed with jubilation in Germany, and especially along the Rhine, where it swept from the soil at one blow all the petty princes and counts, barons, lords, sovereign abbots and bishops, and all such blood-suckers of the people. Finally it introduced a fresh and respirable air, which kindled even in the long-suffering peasants, a higher spirit, and gave them a foretaste of the honor of a freeman. The emancipation of the people also gave to the Revolution its undying significance in the history of culture. Henceforth the bondmen or slaves of the Middle Ages disappeared. With the close of this Revolution, therefore, the new epoch should commence. For it was first able, though not completely or immediately, to do away with the thraldom and the mould of the so-called Middle Ages! Before it, and alas, here and there long, long, after it,[1] gallows projected everywhere into the air, not only for the numerous bands of thieves and robbers, but also for the petty crimes of the common people and the Jews, who lived outside of the pale of the law and in want. But there were none for the nobles, whose game often trampled and devoured the crops of the peasants. Not a few communities still retain from that period their gallows-field. — All this the Idealism of the 18th century (often at the present day so bitterly reviled) made away with forever! It was an age which showed a wonderful mixture of insight and narrow-mindedness, of free thought and superstition, of despotism and humanity, a constant fermentation of all the strength and weakness of the human mind, while the products of that fermentation were not perfected and separated until our own century.

The numerous wars of the century had no great influence upon the development of medical culture, except in surgery. Upon the other departments of medicine they produced either no effect, or at least results much less conspicuous.

The 18th century is also important in the history of culture, inasmuch as by its skeptical and critical, or "enlightening" tendency it laid the axe to the roots of religion. This began among the higher and the highest circles of society, whose members at that time certainly did not dream that they were thus necessarily preparing the lower classes to finally oppose all authority, even political authority, skeptically and aggressively, as was done in the 18th century by the commons, and is done to-day by the Social Democrats and Anarchists, a result which all the power of their adversaries can no longer prevent. For the mind and social development are stronger than bayonets! The 18th century was revolutionary also in the religious department, and introduced freedom of thought in place of the freedom of creed won during the 16th century, a religion of knowledge in place of the religion of creed.

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[1] "To the right appeared a second gallows of wood. From it hung the blackening remains of its victim. I myself saw him hanging there in my twelfth year (1816). He had not committed murder: he had merely stolen, and something not very great at that" — in Prussia 10 Thaler was sufficient to get one hanged — "but he had stolen frequently, and had been condemned to be hanged in chains. For 10 years at the least (until 1826) his remains continued visible." (Stromeyer, "Erinnerungen".) The bones of one hanged were a favorite remedy among the common people!

The former expression involves a contradiction in terms, for faith and knowledge never did, and never could, coincide, and when an effort has been made to combine them, they have either transformed themselves into mystical caricatures, or have made more sharply prominent their contradictions, placing on the one side irreligion, manifesting itself first in the higher classes and, with historical necessity, transmitted during the present century to the lower; and upon the other professional (if such an expression is permissible) or priestly side ranging bluff faith in the letter of the law, from which we are to-day suffering.—In the department of medicine the tendency referred to above expressed itself finally in thrusting aside all other sources of knowledge except the senses. In consequence of the "irreligious" tendency of the 18th century, clerical physicians, however, for the first time disappeared completely from the ranks of the medical profession. Yet during this period some of these still officiated as lithotomists and operative oculists, though only in isolated cases, like e. g. Frère Côme and Joachim Wrabetz (born 1740), the latter of whom was even a professor in Prague.

In the other departments of thought pure Idealism everywhere asserted its power and its supremacy; in philosophy — we need mention only Leibnitz and Kant — in the natural sciences — here the deductive teachings of Stahl, Linnæus, Lavoisier and others must be noticed — in the department of politics as cosmopolitism and the so-called enlightened despotism — above all in literature and art. For us it created the golden age of German thought.

An abundance of poetical works developed among almost all people, as the highest expression of the idealistic tendency of the 18th century. Among these works we may unhesitatingly claim the first place for the German, without danger of being guilty of national exaggeration in our decision. And this too occurred in spite of the fact that at the beginning, indeed until the middle, of the last century, we possessed only a language almost disagreeable in its character, crowded with foreign words, to which at most German terminations had been applied, and which was never employed by the learned. Of the tongue of Luther and Paracelsus, and of the national spirit of the 16th century, the unfortunate 17th century had left us nothing. It is the fault of this interruption of development of the German mind, effected by the religion of the churches, that our literature has become, in great part, not a literature constructed organically upon that national foundation, but far more a German-antique or German-Hellenic literature, which has never kept in actual touch with German culture, but owes its structure and its form often almost entirely to the Ancients and to foreign influences, to a far greater degree than that of any other people. And how could it be otherwise? The Thirty Years' War deprived us of that which without it must have come, the struggle for that which has furnished in itself an immovable support for other people — a single and powerful native land. Instead of this we preserved God knows how many father-lands and land-fathers, whose petty politics were suited only to smother the remains of national feeling. The florescence of our literature, which developed in the 18th century, stands, however, almost alone, and distinguished from that of all other people by the fact that it unfolded itself *before* the period of political greatness of our country; that it paved the way for that greatness, and, indeed, by a revival of the national spirit, created it. In the arts too, after the Thirty Years' War had as it were extinguished our art, artistic work etc., heretofore so vigorous in its development and so intrinsically important, a return was made to the idealistic tendency of the 16th century. In this connexion we need only recall Asmus Carsten (1754–1798), Raph. Mengs (1728–1798), Cornelius (born 1783), Rauch (both the latter offspring of the 18th century) etc.;

in music Bach, Handel, Haydn, Gluck, Mozart, Beethoven, who, like Gœthe, was half a so-called Realist, and Weber, in whom this realistic tendency was still more prominent. Poetry, as well as the histrionic art, assumed, as we know, the same tendency to the ideal in the hands of Conrad Ekhof (1720–1778) and others.

In this century the ascendancy and the lead in medicine fell to Germany.

The 18th century, as the century of idealistic thought, which, so long as the Germans have enjoyed any culture, has been eminently characteristic of them,[1] matured a large number of medical systems, and not a few purely theoretic therapeutic methods. In fact one system closely pursued another, one method followed close upon the heels of another. An effort was made to meet the demands of science and of practice deductively, as attempted in the 17th and the present century by the analytical method — a thing which seems impossible by either method exclusively, since science and art make, and are required to fulfil, different requisitions.

In the department of medicine, therefore, the most conspicuous and also the most enduring services were rendered by the Germans, instead of the Italians and English, as in the 17th century. As regards permanence, we need recall here only the revival of experimental physiology, the discovery of percussion and the scientific cultivation of statistics; for brilliancy we may mention the systems of Stahl, Hoffmann and Boerhaave, to say nothing of many others.

Although in our age German medicine has gained in comprehensiveness and real substance, the 18th century was, on the whole, the zenith of its glory: for at this period it supplied the impulse for all people, while in the present century the impulse originated with the French, though the Germans follow it very closely.

The inductive efforts and acquisitions in the departments of anatomy, physiology and pathological anatomy must, however, be considered the medium of scientific connexion between the 18th and the 17th centuries. They likewise represent the bond of union with, and the germs of, that analytic method which has been revived, and has attained undue predominance in the 19th century. (Even surgeons pursued a realistic bent). Thus from the 16th century onward the past and the future have stood beside each other in historical sympathy at the bottom, while on the surface of the sea of thought Idealism and Realism have alternated with regular ebb and flow, following each other after periods of centuries, as the tides in periods of a day.

1. INFLUENCE UPON MEDICINE OF PHILOSOPHY AND THE NATURAL SCIENCES. SOME SPECIAL INSTITUTIONS AND LEARNED CORPORATIONS.

Philosophy in the 18th century acted more upon the general condition of culture, than specially upon the direction of medical science. Its open influence upon some of the branches of the latter during the course of this century diminished more and more, and conversely the natural sciences, towards the close of the century, began to exercise a controlling influence upon philosophy itself. Under the shield of enlightenment so-called, philosophy, however, effected some practical benefit by the elevation of medical instruction and the improvement of institutions for instruction.

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[1] Our Realism and Materialism of the present day have come to us from France and England, or rather from the scientific tendency which these countries assumed as early as the last century, and have merely been built up among us into a system and dogma.

At the head of the systems of philosophy which gained extended influence in the 18th century stands the first German system of importance, the Monadology of Baron Gottfr. Wilhelm von Leibnitz (1646–1716), a universal genius who won the greatest reputation also as a mathematician (he invented the differential and integral calculus) and a statesman. His philosophy, which originated in the 17th century, did not become known and active until the eighteenth. He himself did not advance it as a complete theorem. As such it was first published by his pupil Christian Wolff (1678–1754), who thus reaped a considerable harvest of Leibnitz's fame, especially as he expounded his doctrines in German, while Leibnitz had written in French and Latin only. Leibnitz was the inventor of the so-called mathematical method of reasoning, which gained wide diffusion during the last century and even made its appearance in sermons from the pulpit. Wolff's pupil, Alex. Gottlieb Baumgarten (1714–1762), was the creator of æsthetics.

The doctrine of Leibnitz is dualistic. Matter is created, but after creation has no further need of the Creator. It and its powers are permanent, and it is subject to the laws of mechanics. As regards the world of spirit, the basis of the Leibnitz-Wolffian system is formed by the assumption of minute, indivisible, intelligent beings, the so-called monads, which as such are capable of forming conceptions, and are constituents of all bodies and of all beings. Within these bodies, by means of the monads, develop, in regular gradation, slumbering souls, animal souls and reasoning souls, as well as being and thought. To the clearness of the conceptions of these monads corresponds the grade of intelligence of the corresponding being. The monads of man have the clearest conceptions, and therefore man is capable of the highest intelligence. The individual soul-like atoms or automata are emanations of a central monad, who is nothing else than God himself, and they stand, as regards each other and with respect to this central monad, in "pre-established harmony" (Harmonia præstabilita). To this likewise corresponds the assumption that everything which is, is always the best possible under the circumstances (Optimism). Leibnitz in 1695 was the first who laid down the principle of the vital force.

If Leibnitz, in consequence of the language in which he wrote, had substantially only a national influence, it was very different with the so-called Pietists, who are, in a certain sense, to be classed as philosophers — in their capacity as skeptics, opposed to the orthodox dogmatic and consistorial theology of the 17th century. They stood — a Phil. Jac. Spener (1635–1705), Aug. Herm. Francke (1663–1727) and Arnold — in manner and language squarely on national German grounds.

Higher still in the last respect stands Christ. Thomasius of Leipzig (1655–1728), the intrepid and indefatigable champion of light and freedom, and the immortal opponent of witchcraft (everywhere still flourishing) and the highly criminal justice of the rack. He was the model of a university teacher, in which position he never humbled himself to become the servant or tool of a party or clique, or of the existing authorities, but, under the hatred and the persecution of these and of his servile colleagues, he ever bore aloft the banner of mental and moral progress unprofaned, like a genuine knight of the spirit. It must never be forgotten that, after Paracelsus, he was the first among his colleagues petrified in scholastic Latin and profound pedantry, who selected the German tongue for the delivery of his lectures.[1] Compelled by persecution to emigrate to Halle, he was also indirectly the occasion of the foundation in that city of the university, which acted long and energetically as a rock of emancipation from the domestic and foreign intellectual yoke, a work which the universities originally considered, and should consider still, their task.

In England, which, so far as regards faith and morals, is slow to disturb the ancient usages, the assault upon the old ideas was made at first with concealed weapons and more in jest than in earnest. Hence it had no particular effect upon either the outer life or upon science. Among the champions of this kind of warfare belong the aristocratic skeptics and followers of Locke, Anthony Ashley Cooper, Earl of Shaftesbury (1671–1713), and Viscount Henry St. John Bolingbroke (1678–1751). Much deeper, however, was the influence of the philosopher and historian David Hume (1711–1776), to whom, in contrast with the Epicureans of high life just mentioned, truth in itself had some value. If for Hume nothing existed outside of the senses, the physician David Hartley (1705–1757) and the clergyman Joseph Priestley (1733–1804) went still further, the former, like the materialists of the present day, declaring the brain to be an organ for the secretion of thought.

The English philosophers stood in intimate relations with the French (who adopted their hints and ideas), especially through the doctrines of Montesquieu (1686–1755), Voltaire (1694–1778) and Rousseau (1712–1778), the latter the author of the following maxim: "If the sick man trusts to himself alone, his sole hope is indeed in Nature, but he has too *only* his disease to dread." They occupied similar relations with the "Encyclopædists", whose leader was Diderot (1713–1784). Among the latter d'Alembert (1717–1783), who wrote the introduction to the "Encyclopédie", was the most important. Part of the contributers to this work were materialists, like Holbach (1723–1789) of Heidesheim in the Palatinate, Diderot, Condorcet (1743–1794), Claude Adrien Helvetius (1715–1771), Marmontel (1723–1799), and undoubtedly this tendency of theirs gained some influence upon the course of medical views, though chiefly at a later period. Jul. Offroy de la Mettrie (1709–1751) was the earliest of the French materialists. The sensualistic doctrines of the abbé Condillac (1715–1780), who introduced and popularized in France the idea that the Baconian method of experience and induction was essential to the correctness of the results of thought, and the teachings of the physician Pierre Jean George Cabanis (1757–1808), who developed his views, had a very important influence upon medical ideas, especially those of the French. Cabanis was author of the maxims "Medicine is a conjectural science"[2] and "The nerves constitute the entire man". The influence of these views was displayed particularly in the school of Montpellier and even by Bichat.

The bare and putative "enlightenment", nourished by French refuse, was defended in Germany by Nicolai (1733–1811), while, on the other hand, the religious or mystic tendency was represented by Hamann (1730–1783) and Lavater (1741–1801); criticism and the conception of poetry, religion and history, as elements of the history of civilization, by Herder (1744–1803), whom it has recently been endeavored to make a predecessor of Darwin; artistic and religious criticism, most nobly by Lessing (1729–1781), one of the intellectual, and indeed political, reformers of Germany, and the greatest man among the great spirits of the last century. His struggle for religious toleration (even of the Jews) is worthy of special remembrance.

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[1] Matters had gone so far in Germany that, according to Luther, a German, towards the close of the 17th century, could say that he had written his essay in German because it was not dedicated to eternity, and accordingly no one ought to blame him for it!

[2] Celsus says: "Illa tamen moderatius subjiciam: conjecturalem artem esse medicinam, rationemque conjecturæ talem esse, ut eum sæpius aliquando responderit, interdum tamen fallat." (H.)

Influential too upon medicine were the doctrines of the greatest philosopher of the 18th century, the critic *par excellence*, the "Sage of Königsberg", Immanuel Kant (1724–1804). He claimed even the understanding as an object of critical investigation, and by the method of internal observation of self, or experience, defined its limits. He was willing to allow to the natural sciences and particularly to medicine nothing but *à priori* or mathematical reasoning as the method and way of obtaining a knowledge of nature, and thus, if he had acquired greater immediate influence on the course of medical science in his day, he would have made theorizing still more popular in medicine.

In accordance with the spirit of the age, the deductive method prevailed also in jurisprudence, that is to say this science endeavored to lay down on *à priori* principles a system of natural law, which might claim authority for all times and people, and by which a revolt from the existing law might be inaugurated and a sort of legal revolution effected.

In educational matters too a "Return to Nature" was preached (and even practised), a subject in which, indeed, Rousseau took the initiative. This doctrine brought with it as great extravagances as advantages. In Germany Basedow ("Philanthropin") and Salzmann (Schnepfenthal) had the chief and permanent influence upon pedagogy.

If the postulate of a purely deductive method in medicine has proved historically as unsatisfactory as that of the purely analytic system of the present day, on the other hand the former displayed its brilliant side in the chemistry of the 18th century.

For unquestionably chemistry attained to the high grade of scientific development which it reached during the last century solely by following the deductive method. Under any other system it would, from the very mass of accumulated facts, have fallen into such a chaos as that in which medicine finds itself at the present day. The revolution in chemistry was brought about by Stahl's doctrine of the "phlogiston", a principle assumed *à priori*, as well as a peculiar substance in all combustible bodies, which, almost as a matter of course, was at once employed in medicine to establish a theory. For whatever, in the course of ages, admits of being so employed, cannot (as we have already seen sufficiently, and shall often see again) ever escape such a fate. This occurred in the present instance when, after the discovery of oxygen by Karl Wilh. Scheele (1742–1786) and Joseph Priestley (1733–1804) in the year 1774, the correct theory of combustion (and respiration), as opposed to the so-called "antiphlogistic" theory of Stahl, was deduced by Antoine Laurent Lavoisier (the founder of quantitative analysis; born 1743, guillotined in 1794) from the discovery that bodies increase in weight during combustion. Lavoisier also taught the indestructibility of matter and demonstrated that air consisted of oxygen and "moufette"—nitrogen, and that it was not an elementary body. Henry Cavendish (1731–1810) and James Watt (1736–1819) were the first to demonstrate in 1781 the non-elementary character of water, by showing that it was a product of the combustion of hydrogen. A large number of elements were discovered in the 18th century: arsenic and cobalt by Brandt, to whom the discovery of phosphorus in 1669 has been also ascribed; Chlorine and fluorine by Scheele; chromium by Vauquelin; nitrogen by Rutherford; platinum and molybdenum by Wood; nickel by Cronstedt; uranium and zirconium by Klaproth; manganese by Gahn etc. Antoine François de Fourcroy (1755–1809), however, furnished the first medico-chemical investigations upon organized bodies, e. g. milk, chyle, bile etc.

In the department of physics and mathematics, which enjoyed a more profound scientific cultivation at the hands of the immortal Edm. Halley (1656–1742) of Oxford, who by the first calculation of the orbit of a comet gave to astrology, or the superstition of the influence and portent of comets in regard to diseases etc., a blow similar to that of the earlier Copernicus and Kepler; Jean Bernoulli (thesis of the conservation of vital force, 1735); Dollond (achromatic telescope etc., 1758); van Muyschenbroeck (1692–1761) of Leyden; Dionis Papin, professor of physics in Marburg (first steamboat, Papin's digester); the famous Leonhard Euler (1707–1783) of Basel, Fahrenheit (1686–1736), a mechanician of Dantzig (determination of the zero point of mercury in melting snow and saltpeter); Andr. Celsius (1701–1744) of Upsala (constancy of the melting point of iron, 1730); Réaumur (1683–1757; constancy of the boiling-point of water, 1742); Joseph Black (specific and latent heat, 1759; causticity of the alkalis) of Bordeaux, professor in Edinburgh; la Condamine (1701–1774), Laplace (1749–1827) and many others, it was particularly the phenomena of magnetism and electricity, discovered or specially studied by Luigi Aloysio Galvani (1737–1798; Galvanism, 1791) of Bologna, Count Alessandro Volta (1745–1827), Prokop Diwisch (1696–1765; first lightning-rod) — anticipating Benj. Franklin (1706–1790), Nicholson, Count Rumford (who came near the mechanical theory of heat); Dufay (negative and positive electricity, 1773); Gray (conductors and non-conductors of electricity, 1727), and others, which exercised an influence, not always wholesome, upon the theory and practice of medicine.

The 18th century too brought forward that invention, which, in its further development in our own century, has effected a revolution in technics and commerce — the steam engine. Dionis Papin as early as 1707 travelled between Cassel and Minden upon a vessel propelled by steam. James Watt in 1784 improved the steam engine so greatly that he may almost be considered as its inventor. The American Robert Fulton (1765–1815) invented our present steamboat (1803 or 1807), and George Stephenson (1781–1848) of Wylam, near Newcastle, the locomotive. By means of these inventions of men of the last century the civilization of our own century was directed into paths heretofore entirely unheard-of. They likewise became indirectly serviceable to medicine, and especially to military surgery.

Meteorology was freed as far as possible from astrology and made subservient to medicine (and agriculture). In this department special service was rendered by the court-canon Jac. Hemmer (1733–1790), of Hornbach near Zweibrücken, who even at this period erected meteorological stations, and in each monthly report published statistics of diseases and deaths, and Retz (inventor of the quill hygrometer and author of "Meteorologie appliqué à la médecine et l' agriculture".)

The systematic cultivation too of botany, and the discovery of numerous new plants, which were made known and in part introduced into therapeutics by the two Forsters, Condamine, Juan and Antonio Ulloa, Karl Peter Thunberg (1743–1828), Stephen Hales (1677–1761; first hæmodynamometer, 1733), Joh. Jak. Scheuchzer (1672–1733),[1] professor in Zürich, and his brother Johann, Joh. Jak. Dillenius (1687–

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1. He believed he had found the skeleton of a man in the diluvium. In like manner in the thirties of the 18th century Mercati declared the so-called thunder-stones (Donnerkeile) to be stone implements of prehistoric man. In the last third of the 18th century Esper found human bones in the diluvium, in addition to diluvial bones of animals, though Cuvier opposed this view with the assumption that man first began his existence in the alluvial period. He believed the diluvial and alluvial eras separated by a revolution of the earth, a view which maintained vogue down to Lyell, who in 1859 advanced the now generally accepted theory of the slow transformation of the earth. Darwin taught the same thing regarding the animal kingdom. The existence of diluvial man was

1747), professor in Giessen and finally in Oxford, Heinrich Bernh. Rupp (died 1719 in poverty at Jena) of Giessen, Jacquin (after 1768 in Vienna) and many others, did not remain without influence upon medicine, though this was only conspicuous in a few cases. Physicians especially were excited (though only to futile investigations of the same kind) by the systematic labors of the immortal Karl von Linné (1707–1778) of Rashult in Smaland, his pupil Johann Christian Daniel von Schreber (1739–1810), professor in Erlangen, subsequently imperial counsellor, physician-in-ordinary and "Hofpfalzgraf," Bernard and his nephew Antoine Laurent de Jussieu (1748–1831), and at the same period an ever increasing number of physicians acquired a knowledge of this important accessary branch, which supplied a favorite field for recreation to many of them during the 18th century.

The same fortune, at least in the same degree, did not befall the department of mineralogy,
which in the 18th century was transformed into a science by the labors of Joh. Gottschalk Wallerius (1709–1785), Torbern Bergmann (1735–1784), Axel Friedr. Cronstedt (1722–1765), all three Swedes, but particularly through the labors of the famous Abraham Gottlob Werner (1750–1817) of Freiburg. The latter also elevated geology (a German creation) into a science. In France Romé de l' Isle (1736–1790) and the famous crystallographer Hauy (1743–1822) distinguished themselves in an eminent degree.

Finally zoology, which enjoyed a number of laborers quite unrivaled in the history of the sciences,
exercised an active influence upon medicine and especially upon anatomy. We mention only the names of count George Louis Leclerc Buffon (1707–1788), of d' Aubenton, Vicq d' Azyr, Charles Bonnet de Lacepède (1756–1828), Lazaro Spallanzani (1729–1799) professor in Pavia; the Dane O. F. Müller first described carefully and classified the "Infusoria" of Linnæus, giving plates of them in his pioneer work entitled "Animalcula infusoria" etc., 1786; Joh. Christ. Daniel von Schreber, Jac. Christ. Schäffer, superintendent in Regensburg, and the most famous of zoologists next to Buffon, George Leopold Christian Friedrich Dagobert, Baron von Cuvier (1769–1831) of Montbéliard, at that time still in Würtemberg, after Schiller the most famous pupil of the "Karlschule", by whom comparative anatomy was first elevated to a science. Cuvier's activity in this department falls mostly within the present century. From the foregoing it is sufficiently manifest what an active and successful cultivation the natural sciences enjoyed in the 18th century. It follows partly from what has been already said, and it will be further shown in the following exposition of the theories of this period, that certain branches of natural science began to lay the foundation of that influence, which they have attained in so high a degree during the present century. — It may be remarked in this place that in the 18th century the natural sciences belonged in the programme of "enlightenment", as they now belong in the department of "education".

In the 18th century, quite in contrast to our own which delights only in itself, the study of the ancient physicians found numerous votaries and cultivators, for philology, as such, also made as great an advance in this

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demonstrated by discoveries in Abbeville, the "Schussenquelle" in Würtemberg, the robbers' cave near Regensburg etc., and Boucher de Perthe proved that the stone wedges etc. of the diluvial valley of the Somme were the implements of men (1834). At the present day the existence of diluvial man is regarded as established. Scheuchzer was the first to raise the question, and deserves great credit for his penetration (Joh. Ranke).

period, as it had done in the 16th century. We may mention only a few names Fr. A. Wolf, Heyne, Klotz, Ernesti, Adelung, K. A. Böttger, Anne Dacier, Count Caylus etc. From the number of physicians who occupied themselves with literary studies we will distinguish the Orientalist Joh. Jac. Reiske (1716–1774), D. W. Triller in Wittenberg, the famous investigators J. C. W. Moehsen in Berlin, Ph. Gabr. Hensler, Ch. G. Ackermann in Altdorf, C. G. Gruner in Jena, E. G. Baldinger, professor in Jena, Göttingen and Marburg, the great Sprengel, and J. F. Blumenbach. — In France it was the Greek Adamantios Koraes (Coray, died 1833), who there awakened his ancient countrymen to new life. In Italy, besides Morgagni, Ant. Cocchi in Florence (died 1758) Giov. L. Bianconi (1717-1781) in Rome, and finally Leonardo Targa (1730-1815) in Verona, were eminent in this department.

Among the universities founded in the 18th century

(Breslau 1702, Fulda 1711, Bonn 1771, Stuttgart 1781, Pesth 1794 and others, some of which have perished), Göttingen, founded by George August II. in 1737 (its first professors were Haller, G. Gottl. Richter and Joh. A. Segner of Pressburg), Erlangen, founded in 1743 by Friedrich, margrave of Bayreuth, and Münster, 1780, were important nurseries of medical science almost from their foundation.

In addition to all these, medicine found continued cultivation in the learned societies, which constantly arose in increasing numbers.

The following were established during the course of the century: the earliest in Germany was that founded in the year 1700 by Frederick I., at the suggestion of Leibnitz, who was also its first president — the "Königliche Gesellschaft der Wissenschaften und freien Künste zu Berlin", in addition to which a "Neue gelehrte Gesellschaft" appeared in the course of the same year. Both were united in the year 1744 by Frederick the Great into the "Königliche Academie". The "Königliche Gesellschaft der Wissenschaften zu Göttingen" was then foundod in 1751 through the influence of Haller. Besides these two exceedingly famous societies, there were founded in the father-lands, at that time so numerous, the "Churbaierische Akademie der Wissenschaften" of Munich (1759), the "Churpfälzische Akademie der Wissenschaften" of Mannheim (1763), the "Churmainzische Akademie" of Erfurt (1754), and an "Oekonomische Gesellschaft" of Leipzig (1765). Switzerland, which had long lost its high rank in the cultivation of the medical sciences, received a new impulse through the "Gesellschaft der Aerzte und Naturforscher" of Basel (1751) and the "Naturforschende Gesellschaft" of Zürich (1757), and to a less degree through the "Schintznacher patriotische Gesellschaft für alle Schweizer-Aerzte". As regards foreign countries, in France the "Sociétés Royales des Sciences" of Bordeaux (1714), Montpellier (1706), Lyons (1724), Dijon (1725) and other places were called to life, and the "Société Royale de Médicine" of Paris was founded by Lassone (1717-1788), while England received in 1757 its "Society of Physicians" of London, and in Edinburgh a society of similar name was formed as early as the year 1731.[1] Besides these were established the "Imperial Russian Society" of St. Petersburg (1724), "Royal Swedish Academies" at Stockholm (1739) and Upsala (1740), the

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[1] I am not quite certain to what associations these titles refer. The only medical societies of importance founded in Great Britain during the 18th century with which I am acquainted are "The Royal Medical Society of Edinburgh", founded in 1737 and chartered in 1778, "The Medical Society of London", founded 1773 and "The Abernethian Society of London", founded in 1795. (H.)

"Hollandse Maatschappy der Weetenschappen" at Haarlem, Vlissingen and Rotterdam, the "Royal Danish Society" of Stockholm, the "Institute of the Sciences and Arts" at Bologna, the "Royal Society" at Turin etc.

In addition to the cultivation of the sciences in the "Akten", "Abhandlungen", "Mémoires", "Commentarien", "Anzeigen", "Transactions", "Handlinger", "Skrifter" etc., published by these societies, the efforts at criticism were specially promoted by the "Commercium norimbergense", which enjoyed an international importance; by the "allgemeine deutsche Bibliothek", which, as early as the close of the century, could point to 100 volumes; by the "Göttingen'schen gelehrten Anzeigen", which enjoyed special advantages in the co-operation of Haller; by the "Jena'sche allgemeine Literaturzeitung" and numerous exclusively medical journals under the titles of "Bibliotheken", "Magazines" etc., etc.

The famous weekly journal, "Der Arzt", of the talented and philosophic Unzer was calculated rather for the great mass of readers. It was designed, according to the programme of the century, to serve the cause of "enlightenment", to which a large number of books and treatises of the popular sort were dedicated by Tissot, Zimmermann and others.

The journalism of the 18th century displayed too an entirely peculiar character: it went, on the whole, carefully into the selection of its matter, was not interlarded with so-called interesting cases, easy to be found and long-winded, or manufactured to order and stupidly utilized, and was not to an excessive degree in the bonds of individual publishers and literary speculators, but was under the control, and in some cases the actual property, of eminent savants. From the fact that the language of these journals was still Latin, their influence was more international than it is to-day.

It is self-evident that even in the 18th century, in spite of all the efforts and institutions devoted to the service of "enlightenment", everything was not thoroughly "enlightened". The famous de Haën e. g. defended the existence of demons, and a professor of theology, Angel. März, as late as 1760 discussed witches and magic in a book devoted to this subject. (Something of the same kind has been done recently by Perty of Berne). The burning of witches, which occurred in Glarus as late as 1783, casts still stronger lights and shadows upon the 18th century. Witches were burned in Mexico too as late as 1877, and in 1821 there was still a statute regarding witches in Ireland. Vilmar, about the middle of this century, again defended the belief in witches. All this, in addition to other evidences, proves that the mark which the most eminent spirits of any age place before themselves, can be attained by a small number only, never by the mass, and that error and delusion affect the masses much more quickly, and stick to them infinitely more closely, than their opposites.

How else can we explain the order of the Illuminati, and such phenomena as the attainment of a great following by an Immanuel Swedenborg (1689–1772), a Father Joseph Gassner (1727–1779) and an inn-keeper Schröpfer of Leipzig (he shot himself in 1774), of whom the former employed the aid of celestial mysticism, the latter that of exorcisms, in cases of disease? How else can we consider possible the impostures of a Count Alessandro Cagliostro (1743–1795), of a St. Germain (whose so-called "Lebensthee", a purgative tea, still exists in our pharmacology), or the miracles performed at the grave of François de Paris in the years 1727–1732? To occupy oneself with such superstitions[1] belonged, even in the century of enlightenment, to the noble passions, and even distinguished physicians, like Fried. Hoffmann and still more de Haën, were defenders, or perhaps believers, of such trumpery. Hereafter we shall also meet with a Mesmer, whose influence has descended to our own day. As late as the year 1773, he who drew out of the water a man drowning or drowned, and he who killed a dog in self-defence, was regarded among laborers as "dishonored".

But opposed to these stand more agreeable phenomena! From the bloom of belles-lettres German medicine drew an advantage which must not be underestimated. The zeal thereby aroused for art in general, and for the art of language in particular, brought it about that the Latin tongue, which until late in the century had been *alone* considered worthy of a savant and particularly of a professor, was no longer employed by a few of the most eminent physicians in any of their works, and by others was discarded at least in many of them. Moreover physicians devoted themselves, so far as circumstances would admit, to the cultivation of rhetorical forms. The official language of the universities, however, was not as yet German. From this struggle after versatility of accomplishments there arose in medicine during the 18th century a group of classical writers,[2] small indeed, but on this account to be estimated only the more highly, in whom artistic, moral and scientific perfection were equally united.

2. MEDICAL SYSTEMS AND THEORIES OF THE 18TH CENTURY.

If the 17th century was the age of medical schools, the 18th was the age of systems and theories. None of the preceding centuries exhibits, even approximately, so great a number of the latter; indeed all preceding history is scarcely so rich in such developments. They sprung up with premature luxuriance from the soil of medicine, saturated with the immature and as yet insufficiently digested material derived from the natural sciences — a material conceived *a priori*, in opposition to the method of the preceding century — and thoroughly steeped in its own newly acquired stores of knowledge. But they appeared only to wither and pass away even more rapidly almost than they arose, or perhaps merely to struggle for a time with some rival for a brief existence — a struggle in which both stimulated into utter corruption the germ of decay which they contained from their birth.

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[1] And what shall we say of the so-called "Christian Science", "Faith cures" *et id omne genus*, which disgrace the "enlightenment" of the great 19th century. (H.)

[2] Compare Heinrich Rohlfs (born in 1827 at Vegesack, near Bremen), "Die medicinischen Klassiker Deutschlands, Ferd. Enke, Stuttgart, 1875", and Hirschfeld, Leipzig.

If we wished to prove the barrenness and untenability of systematic elaborations of medicine, which are based for the most part only upon some few facts, and these interpreted by enthusiasm, the history of the medical systems of the 18th century, in their day so highly valued on the one side, and so strongly opposed on the other, would alone almost suffice.

That, in addition to the new systems, those of the Iatro-chemists and Iatro-mathematicians of the 17th century could still show numerous followers until far into the 18th century, we have already shown, for the sake of completeness, in our preceding account of these systems. Thus also the two centuries remained in unbroken connexion. Into some of these new systems even the doctrines of the former systems were transferred, or, under new names and with a few changes, the whole systematic basis of the old systems was adopted by the new, as will become manifest in our account of the latter. Frequently too old ideas under new names and denominations came into prominence and popularity; for most so-called new systems have always been in the main revivals of the old, made to appear new by some few additions.

Moreover the medicine of the 18th century received from the systems which crowded so rapidly upon each other a leaven, always active and constantly renewed, so that it drew from them continually that benefit which active interchange of ideas and thoughts ever brings in all departments. For it has always been the fact that systems have *permanently* disturbed and arrested the development of medicine only when, like the Dogmatic and the Galenic, they have too long preserved an undisputed ascendancy. Besides, the rage for systems of medicine in the 18th century did not degenerate into pure theory, but beside and within these systems the art of observation was cultivated in a prominent, though not the so-called exact way, and was always practised carefully and soberly, with the sole aid of reason and the natural senses. But bad, alas, worse than bad, was the final influence of theories upon therapeutics (an apparently necessary result even down to the present day), although this is precisely the department which ought least to lapse into theory. For otherwise enthusiasm, harmless in itself, becomes converted not rarely into actual murder, and murder which involves the additional horror of resulting from the good intentions of a humane art. The first purely

a. Eclectic System,

similar to that of Galen, with whom its author too has been (certainly falsely) compared, originated with

Hermann Boerhaave (Boerhaaven, 1668–1738), the most famous physician, not only of the 18th, but probably of any modern century.

The eldest son of a clergyman of the village of Voorhout near Leyden, who, like ministers generally, was blessed with thirteen children, Boerhaave was originally intended for the profession of his father, and with this view had studied philosophy, history, logic, metaphysics, philology and theology, as well as mathematics, with great zeal. He was first led to turn his attention to the study of medicine because the

Protestant "Guard of Zion" (Zionswächter) believed that the purity of the doctrine of Christ (which, as we all know, stands under the protection of the Protestant uniform) was endangered by Boerhaave, a follower of Spinoza (he had been denounced as such by one of the pupils of the latter), and accordingly wished to withhold that dress from him. Mathematics he declared the most important of the sciences accessory to medicine (Rohlfs). He first studied thoroughly chemistry and botany, both of which branches he subsequently advanced, especially chemistry.[1] He then pursued anatomy and the theory of medicine under Drelincourt and Nuck. In the other branches he was his own instructor. Graduating in 1693 (his thesis was upon the alvine evacuations), he practised in Leyden with such success that he was offered the position of ordinary physician to the king. He, however, declined this position and became a private teacher at Leyden. After the death of Hotton (1709), he received the chair of medicine and botany, and in 1714 was given also the chair of the practice of medicine, in place of the deceased Bidloo. Subsequently (1718, on the death of Lemort) he acquired also the professorship of chemistry, in which position he likewise displayed great capacity, and by his text-book aided in securing for this science general diffusion and greater acceptance. He was the first who asserted the affinity of heterogeneous substances, and by his improvement of the process for preparing vinegar he showed himself a technological chemist. As a clinical teacher (after 1714) he lectured extempore, and in this position, to which he brought the rarest talent, he attained such reputation that he attracted to Leyden hearers from all quarters of the world, so that no lecture-room in the university could contain them. Boerhaave was the first who gave separate lectures on the subject of ophthalmology, and who employed the magnifying glass in the examination of the eye. As a practitioner he was no less popular, as may be judged from the fact that, although he was not sparing of money in the acquisition of fine editions of books and in the advancement of scientific objects, he yet left an estate of two millions. Boerhaave was so famous that a Chinese official once sent him a letter addressed simply "To the most famous physician of Europe." He made Peter the Great too wait one night to see him, because he made no distinction in his patients, and did not, like many of our modern professors, regulate his visiting-list by the purses of his clientèle. His conclusion with regard to physicians, however, ran as follows: "If we compare the good which a half dozen true sons of Æsculapius have accomplished since the origin of medical art upon the earth, with the evil which the immense mass of doctors of this profession among the human race have done, there can be no doubt that it would have been far better if there had never been any physicians in the world." Boerhaave succumbed to the gout, which had afflicted him from 1722 and as early as 1729 had compelled him to resign his position. Of his four children, one daughter alone survived him. His most eminent pupils were Haller, van Swieten, de Haën, Gaub and Cullen.

Boerhaave was a person extolled (somewhat like Hufeland in our own century) as a great savant, physician and man, by all, almost without exception, during the whole of the last century. Such a phenomenon, doubly striking, and, indeed, astonishing, in a physician, could proceed only from his mediatorial position in science and art, and still more from his benevolent and pure character, from which even fame (the rock upon which so many small minds founder) did not take away the modesty of a truthful thinker and a great savant. He was free from all the disputatiousness and vanity of the savant, a virtue especially striking when we compare it with the pugnacity displayed by even the most famous physi-

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1. According to Rohlfs he was the first who made chemical investigations of urine.

cians of the same, or a little later age. None of his pupils was ungrateful to him, though none further elaborated his doctrines — a thing fundamentally impossible in consequence of his eclecticism. The most important of them changed his system in many respects; others, like van Swieten, sought only to explain and to comprehend his views. Many of his often oracular aphorisms to-day seem rather ambiguous than profound, and not infrequently they are unacceptable, while his maxim "Simplicity is the seal of truth" is never manifested in his treatment. He already employed the thermometer (in the axilla), the simple lens etc. in the examination of his cases, adopting them from the Iatro-physicists of the 17th century. The latter are the predecessors of the fashion so popular with us, and which is in many respects only a revival (frequently an unconscious one) of the theory and practice of the more important physicians of that sect.

The doctrines of Boerhaave do not form any intrinsically new system, but rather comprehend many ideas of the earlier systems. It is difficult to discover a leading principle in the expositions of them which we have received. No selection from any one of the earlier systems prevails, but rather an effort to collect and combine what is good in all of them, like that of Galen without bringing forward a strict system. Boerhaave proceeds neither by synthesis alone, nor yet by simple analysis, but employs both methods.

First we find the well-worn doctrine of "laxum and strictum" of the Methodists, only it is employed with the simulation of greater precision obtained by the use of the microscope and a so-called "fibre", tense fibre, relaxed fibre. Debility is also added as a third community, weak fibre (fibræ debilitas). With Boerhaave we find again too the "putridity" (putredo) of the Pneumatics, defined, however, more precisely as that process within the fluids, by which they exhale much water. He also employs the Hippocratic "enormon" as the cause of "motion", which latter is, in his view, the highest principle and identical with life, i. e. the reciprocal influence upon each other of the body and spirit. The "enormon" is regarded as an unknown something, which is neither matter nor spirit alone, and is not cognizable by the senses, but which occasions the perceptions of the senses and "motions".

As in the foregoing exposition the pathological ideas of Solidism and of the Dynamic School predominate, so in what follows we find those of the Humorists and the Iatro-mechanics. Thus we observe the doctrines of obstruction and the error loci of Erasistratus and the Iatro-physicists, only the basis of the process is placed in the newly discovered blood-corpuscles, which remain sticking in the smallest vessels, in consequence of a too smooth, too bulky, too angular, too sharp-cornered etc. constitution. The iatro-chemical acridities of the fluids (he received the latter into his system as the humoral element) also play with Boerhaave a most important rôle, almost more important than with the Iatro-chemists. There are acid, saline, oleaginous, glutinous, alkaline and mixed "acridities" (acrimoniæ). These are the commonest causes of disease: they originate from the food and are especially active in chronic diseases. The latter, with the inflammatory diseases, he handles particularly well (Rohlfs). The Iatro-mechanical principle (belonging properly also to Erasistratus) of the friction taking place between the stagnant fluids (stasis of the new Vienna school) and those still in motion, serves him in the explanation of inflammation. — Plethora likewise receives a place among his causes of disease.

According to Boerhaave, disease is that condition in which the bodily "actions"[1] are disturbed or unsettled, and take place only with difficulty. The reverse of this condition furnishes his conception of health. Fever is the effort of nature to ward off death. Hence the nervous fluid flows too quickly into the muscles and the heart contracts too rapidly, so that the blood flows too rapidly in the capillaries.

Digestion, like the circulation, is explained on mechanical principles. Boerhaave's most important works are the "Aphorismi" and "Institutiones".

The following extract will enable us to form an idea of the views and the style — he writes a good Latin — of Boerhaave, as well as of his therapeutic principles.

"The antecedent causes of this acid acridity are: 1. Food consisting of farinaceous, acid and juicy (succulentis acidis), fresh, raw, fermenting or fermented portions of vegetables: 2. The want of good blood in the body which receives this nutriment 3. Debility of the fibrous tissue (fibrosæ compagis), the vessels and intestines: 4. Lack of animal motion.

Primarily it has its seat chiefly in the localities of primary digestion (primæ digestionis officinas), whence it slowly infects the blood and finally all the humors. It occasions acid eructations, hunger, pain in the stomach and bowels, flatulence, spasms, sluggishness of, and various changes in the bile, acid chyle and sour-smelling fæces. In the blood it produces pallor, acid chyle, and hence in women acid milk or rather milk too prone to acidity, sour perspiration, acid saliva, and thus itching, obstructions, pustules, ulcers, too rapid curdling of the milk, and perhaps also of the blood itself, whereby the latter becomes less fitted for circulation, then excitement of the brain and nerves with resulting convulsions, disturbance of the circulation, and finally death. From these symptoms we recognize the present, future and past tendency to acidity. Hence its effects may be perfectly predicted and the mode of cure may be known. The cure is effected: 1. By animal and vegetable food opposed to acidity: 2. By the fluids of birds of prey (avibus rapacibus!), which fluids resemble good blood: 3. By strengthening remedies: 4. By active movement: 5. By medicines which absorb, dilute, weaken or change the acid. The selection, preparation, dose and timely employment of these remedies depend upon the judgment of the physician as to the disease, its seat, the condition of the patient etc. Hence it is clear why this disease is so common in boys, the indolent, young women and certain artisans." How greatly views have changed since Boerhaave's day, and how differently we look at things now, may be judged from a perusal of the foregoing extract, and we may likewise infer that the same thing may readily happen, some day or another, to our own ideas. Such things must be looked at in an historical light in order to avoid condemning them too hastily.

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[1] Actiones vitales, naturales, vel et animales.

In therapeutics, besides his efforts to sweeten the acid, to purify the stomach, to get rid of the acridities etc., Boerhaave claimed Hippocrates and Sydenham as his models, but without being by any means exempt from hypotheses in his determination of the indications. He was, however, for his time comparatively simple in his actual therapeutic prescriptions, although the latter were often enough odd in their character, e. g. the blood of birds of prey. His medicines were, at all events, less effective than his personal presence, which indeed is true, mutatis mutandis, of all treatment.

It was Boerhaave who first permanently established the clinical method of instruction, and its diffusion was due to his pupils, particularly Haller and van Swieten. His influence in a medico-historical point of view is greater than his real scientific importance would warrant.

The adherents of Boerhaave — he had no school of followers — incline for the most part to dynamic or vitalistic principles. This was the case with

ABRAHAM KAAUW BOERHAAVE (1715–1758),

his nephew, who extended the doctrine of the "enormon" (which he named "Impetum faciens") and was likewise addicted to alchemistic and pietistic deductions. He was the first since the days of Erasistratus to emphasize once more the distinction between nerves of motion and of sensation. — Of greater reputation and importance was Boerhaave's favorite pupil and successor the Eclectic

HIERONYMUS DAVID GAUB (1705–1780) of Heidelberg, professor in Leyden from 1731, who was inferior only to Boerhaave himself in his fame as a teacher. He wrote the first complete work[1] on the exclusive subject of general pathology, in which he shows himself a follower of the Dynamic School. Among the defects of "fibre" he adopted from Boerhaave only tension and feebleness, omitting laxity, while he maintained the existence of an independent "vital force", to which he assigned energy and receptivity, and which has its seat in the solid parts alone. These defects might increase into irritability, or sink away into torpor. To irritability he assigns sensation and motion, but considers both the result of irritation. In this respect he approaches the doctrine of Haller. Besides these conditions of solid pathology taken quantitatively, Gaub admits, however, defects of the fluids also. These, however, he thinks originate only in diseases of the solid parts. In like manner he concedes to the fluids a concealed vital force.

In general therapeutics he considers the healing power of nature amply sufficient to remove sickness, which latter he declares just as natural as life and death. This healing power, however, he credits sometimes to the soul, sometimes to the body. — Gaub's views continued to prevail for a long period.

JOH. VON GORTER (1689–1762),

professor at once of medicine, surgery, and the natural sciences at Harderwyk, forsook Boerhaave's theory of inflammation, and finds the latter occasioned by an irritation acting upon the smallest vessels, which are endowed with vital motion. Neglecting purely mechanical explanations, he distinguishes from each other a soul and an independent force of living parts, which he concedes even to plants, and designates as "vital movement". It is independent of the nerves or vital spirits, and is different from elasticity.

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[1] The "Institutiones pathologiæ medicinalis", Leyden, 1750. (H.)

Boerhaave's principles were mainly followed by Christian Ström; Hermann (1672–1744) and Joh. Oosterdyk Schacht (1704–1791), professor in Utrecht; Joh. Theod. Eller, ordinary physician, and the surgeon Sam. Schaarschmidt, both of Berlin; Gottlieb Christian Ludwig (1709–1773), professor in Leipzig; Rud. Augustin Vogel (1724–1774), a well known teacher in Göttingen, and others. Van Swieten, de Haën and Haller were, however, his most eminent pupils.

In complete opposition to the theoretical variety of Boerhaave's system and to the mixed system of Hoffmann, still to be considered, the

b. System of Georg Ernst Stahl

is distinguished by its strict consistency in carrying out its principles and by the utmost independence. Stahl (1660–1734) was one of the most important Systematists of the 18th, and indeed of any, century, a thinker as profound as he was earnest, and has already been introduced to us as a pioneer chemist.

He was born in Ansbach and studied in Jena under the famous Iatro-chemist G. W. Wedel. Graduating at the age of twenty-five, he at once began lecturing at the university of Jena, until at the expiration of two years he was called to Weimar as physician-in-ordinary. From thence, on the recommendation of Fr. Hoffmann, he came in 1694 to Halle as professor of pathology, dietetics, physiology, pharmacology and botany. At first he lived on friendly terms with Hoffmann, but subsequently they became estranged. At the age of fifty-six he was appointed ordinary physician in Berlin, a position which he held until his death. Stahl, like his converted namesake in our century, was a great pietist and a man of stiff and rough manners, unchangeably true to his laboriously acquired convictions, and bitter and reserved at their non-acceptance. For he held these convictions to be as important as a revelation from God (an expression of pietistic pride), and in fact regarded them as such a revelation. The success of another seemed also a personal injury to himself, and accordingly from a hypochondriacal croaker he became gradually a confirmed misanthrope, until finally his morbid reserve and gloomy moroseness ended in actual melancholy. Pecuniary profit, however, he never sought, and its pursuit he scorned. He is regarded as one of the chief promoters of medical teleology among the Moderns. Stahl's numerous works are written partly in German, partly in Latin. In the former the language is broad and clumsy, the expressions often unusual and obscure, the composition cramped and long-winded, and the sense not rarely ambiguous from his coinage of new terms. His most important work (Latin) is entitled "Theoria medica vera" etc. (Halle, 1707.)

The system of Stahl is dynamico-organic, pietistic and antagonistic. He makes the "soul" (anima) the supreme principle. It is the special life-giving and life-preserving principle, not to be confounded with spirit, but about the same thing as the "Physis" and "Natura" of other authors. It imparts life to dead matter, is active in generation, as well on the side of the father as of the mother, on the one hand provides for itself the body, and on the other counteracts the constant tendency of the latter to decay and corruption, which actually enter only when this principle voluntarily abandons the body to death. It is, however, something entirely independent, self-conscious and self-creative. In the preservation of the body the soul acts through "motion", which takes care of the reception, as well as the excretion, of material, processes which are the basis of life. It, however, does not invariably effect orderly, regular, "tonic", i. e. sometimes contracting sometimes relaxing, movements (which represent "health"), but is in some cases hindered or obstructed, and this obstruction may even proceed from the body or its organs. If such is the case, "health" is changed into "disease", which latter again is nothing but an effort of the soul to restore these tonic movements in the organism. With this object it is frequently compelled to make powerful exertions. As the soul ordinarily employs the circulation and the capacity of the parts of the body for contraction and relaxation (tonus), as the route and instrument of its influence upon the body, so also in disease, where, in consequence of the necessarily hastened and increased activity of the soul, either the pulse is accelerated, the temperature rises etc., in a word "fever" makes its appearance, or spasmodic movements, "convulsions", are developed. In the false movements within the organism lies also the main cause of sicknesses, but not in the numerous external influences assumed by others Were the latter the case, the frequency of sickness and the number of diseases would necessarily be much greater than they, in fact, are.

Since too the soul governs the organism chiefly by way of the circulation, disturbances and stagnation in the latter are also main causes of disease. These disturbances arise most frequently from "plethora", which plays an important rôle in the system and the therapeutics of Stahl. To get rid of this plethora the soul employs the means mentioned above; either fever, with its heat, by which the blood is imperceptibly driven out or dissolved, or convulsive movements, by which the blood is driven into certain parts and there visibly discharged.

In childhood plethora produces a pressure of blood toward the head, and the soul, as a compensation for this, provides a hæmorrhage from the nose. During youth this blood-pressure is directed rather towards the chest, and is equalized by hæmoptysis and pneumorrhagia, while at the period of sexual maturity in like manner arise monthly discharges and "the piles" ("goldene Ader"), which Stahl considers a safety-valve of the utmost importance. From this time dates the very high estimation of "hæmorrhoids", the "hæmorrhoidal impulses", the "hæmorrhoidal flow", which prevailed among physicians until a very recent period, and is the rule among the laity even at the present day. When this hæmorrhoidal flow stagnates, it is by all means to be again started up. In the stoppage of this flow lie the chief causes of hypochondria and melancholy, as well as of all chronic diseases. The vena portæ, as we know, is the trunk of the hæmorrhoidal veins; hence the famous aphorism: vena portæ porta malorum!

Fever, as we have seen, was for Stahl a salutary effort of the soul to preserve the body. This was true even of intermittent fever, and accordingly he never suppressed this disease with cinchona. On the other hand, inflammation was, in his view, a stagnation of the blood (an Iatro-mechanical idea — and such ideas are accepted by him also in other directions) under the forms of erysipelas, phlegmon and its suppuration.

Stahl scorned anatomy and physiology, was an enemy of erudition and its authorities, and swore boldly by the maxim that good theorists (among whom he was one of the chief) may be bad practitioners.

> "The structure of the meandering passages in the ear, of the anvil, the hammer and the stirrup, and — what a noble discovery! — the round ossicle, if it were unknown would render the physical knowledge of the body very defective. But medicine (i. e. practical medicine) profits by this knowledge precisely as much as by the knowledge of the snow which fell ten years ago."

This has been said, as we know, by several of the greatest physicians besides Stahl. Though one of the most eminent chemists of any age — he liberated chemistry from the stain of alchemy and from its servitude to pharmacy, and transformed it into an independent science — Stahl spoke warmly against the employment of this science in medical theory, and in general against the over-estimation of the natural sciences in the latter. He likewise raised a note of warning against favoring the branches subsidiary to medicine to the prejudice of the mother science, a warning renewed at the present day from quite as competent authority. "If in the body", which Stahl taught should be regarded as a living organism, "chemical laws are active, then it must fall into corruption", was his view.

In therapeutics, Stahl placed at the head the healing power of nature, which is identical with his "soul". "It is the simple truth that man has his physician in himself, that nature is the physician of diseases, and offers a better prospect of curing diseases than the most successful apparatus of our art." For the rest, he follows his system here too with the utmost strictness. The soul, as it is the cause of all diseases, so is it that which cures them all. Therapeutics can, or rather should, act upon this alone, that is upon the "movements" occasioned by it. If too strong they must be restrained; if too feeble or utterly wanting, we must endeavor to strengthen them or to call them forth. Venesection, of which Stahl made excessive use in acute as well as in chronic cases, is to be considered the main check upon these movements. He even recommended venesection as a preventive measure — twice a year — and by it the people have been served and injured down to our modern times. Beside venesection he ranked care to re-establish the hæmorrhoidal flow by the use of irritating drugs, which Stahl in other circumstances discarded. To these measures were added his "balsamic pills" (aloes, hellebore etc.), Stomach-powder, Essentia alexipharmaca etc., nostrums which brought him a lucrative business. In addition, Stahl gave purgatives and emetics, diaphoretics and especially alteratives, including his favorite saltpeter. He discarded however, many effective drugs (and particularly the poisons), above all the Cinchona (because by its astringent properties it suppressed the febrile state, which was in itself sanative), opium (because it restrained the "movements"), ferruginous preparations and mineral waters, because Hoffmann recommended them etc. On the whole he professed to follow the principle of Hippocrates, according to which the duty of the physician frequently consists in careful expectant observation, but, on the other hand, in treatment at the right time.

Stahl's doctrine has been called "Animism". It was the reaction against the exclusively mechanical and chemical theories of the 17th century — and has fulfilled its mission in the history of culture.

"It was enough for Stahl, in contrast to his contemporaries, who were all too prone to utilize the laws of mechanics then alone known, and the trifling chemical knowledge of that period, of which they were proud, and which they employed entirely too extensively in the explanation of the phenomena of life — it was sufficient, I say, for Stahl to have rescued life as a specific active force, at least for organized beings" (Spiess.)

Stahl obtained no inconsiderable number of followers, though some of them, indeed, departed widely from his doctrines and preserved merely the fundamental principles of Vitalism, though under other names.

In the judgment of Stahl himself Joh. Sam. Karl (1676–1757) of Oehringen, physician-in-ordinary first at Isenburg and then in Denmark, was, according to Juncker, his most faithful pupil. He differed, however, from his master in regard to preventive venesection, and also considered horse-dung useful to drive out the small-pox. Georg. Dan. Coschwitz (1679–1729), professor in Halle, and Joh. Dan. Gohl (whose pseudonym was Ursinus Wahrmund, 1675–1731), a physician in Berlin and resident physician at the springs of Freyenwald; Michael Alberti (1682–1757), professor in Altdorf-Nürnburg; Andr. Ottomar Goelicke (1671–1744), professor in Frankfort-on-the-Oder; Johann Juncker (1680–1759) of Londorf, near Giessen, professor, and the first clinical professor in Halle; Georg. Phil. Nenter, professor in Strassburg; Christian von Hellwich (1663–1721) in Erfurt, were all followers of Stahl.

To these should be added the eminent physiologist of the nervous system (centripetal and centrifugal nervous conduction etc.) Joh. Aug. Unzer (1727–1799), a practising physician in Hamburg and subsequently professor in Rinteln. He strongly distinguished the mechanical phenomena of the body from the workings of the soul, and held that the nervous influence was brought about by the power of the latter, which he identified with "Irritability and Sensibility" and "Vital force". Unzer too, like Gaub, defended the Stahl-Hallerian doctrines. As a popular author of taste and spirit he also obtained wide esteem, popularity and posthumous fame in professional circles, particularly by his journal "der Arzt", which made its appearance in 1759 and survived for 12 years. Unzer, like the physician next mentioned and many others, furnishes an example how in the last century practising physicians took a controlling or at least an important position in science, and possessed the courage of their own convictions and experience.

All the physicians just mentioned followed more or less strictly the soul doctrine of Stahl. Friedr. Casimir Medicus (1736–1808), a physician of Mannheim, who placed the "vital force" beside the soul, but also accepted the Iatro-mechanical doctrines, was, however, already strongly influenced by Vitalistic principles. He held that the ganglia are the cause why the vital functions take place without the influence of the consciousness and the will, and thought that both were restrained by the former. The "last champion" of the doctrines of Stahl was Ernst Platner (1744–1818), professor in Leipzig and the ablest mind among his partisans. The best known, however — and also the wealthiest — among them was the inventor of the "Halle Remedies", Christian Friedrich Richter (1676–1711) of Sorau, whose "Höchstnöthige Erkäntniss des Menschen, sonderlich nach dem Leibe und naturlichen Leben" survived seven editions. One of his wealthy heirs was David Samuel Madai (1709–1780).

Besides the physicians already introduced by anticipation among the Iatro-mechanicians of England in our account of the 17th century, but who are to be reckoned in the 18th century, and who favored the principles of Stahl, we must mention as still purer followers of that physician:

Robert Whytt (1714–1766), professor in Edinburgh, an adroit defender of Stahl, and, as we shall see, an opponent of Haller; William Porterfield, (invented and named the first optometer, 1759), also about the middle of the century in Edinburgh; Thomas Simson, about the same period professor at the university of St. Andrew's in Scotland; Samuel Farr (1721–1795) of Taunton; Thomas Lawrence (1711–1783); James Mackittrick and others.

Among the French the doctrines of Stahl gained popularity especially through the labors of

François Boissier de la Croix de Sauvages (1706–1767), the forerunner of Pinel and an opponent of pure mechanics, who animated the latter system with Stahl's "soul", which he considered the cause of the mechanical actions in the body. He was accordingly an animistic mechanician. This was the age of artificial "systems", and hence Sauvages in his "Nosologia Methodica" supplied a system which contained 10 "classes" of diseases, each of which again had several "orders" — some as many as seven — 295 "genera", and 2400 "species".

Linnæus had 325 genera of disease. Other classifications were framed by David Macbride (1727–1778); R. A. Vogel; Joh. Ernst Hebenstreit (1701–1757), professor in Leipzig; Cullen (4 classes with 149 genera); J. B Sagar (1702–1781), 12 classes and 315 genera; Nietzky; Chr. Fr. Daniel (1753–1798) of Halle; van den Heuvel; Selle; Ploucquet of Tübingen.

A system opposed to that of Stahl from motives of hostility to both his person and his ideas, was published in the year 1718 by Friedrich Hoffmann, who had before embraced the chemical system, that of Boerhaave, and finally the doctrines of Stahl. The iatro-mechanical foundation of this system approximated it most nearly to the ideas of Boerhaave. "Æther" was introduced into the system of Hoffmann as a dynamic but material principle, accordingly not equivalent to the "soul" of Stahl. From this resulted a mixed, and not very logical which was held in high honor by the most eminent physicians and the better minds of the last century, and, indeed, was prized by even Sprengel as the most excellent of all the systems.

Friedrich Hoffmann, the son of a physician of the same name, was born in Halle in 1660. Before attending the university lectures he had devoted much attention to mathematics. During his university course the Iatro-chemist Wedel was his chief teacher. He graduated as early as his twenty-first year, and went as a practising physician to Minden. Thence he travelled in Holland and England, where he studied under the direction of Robert Boyle, the Iatro-mechanic, who was likewise equally famous as a chemist. Returning to Germany he was in 1688 appointed to the "Physikat" of Halberstadt, whence six years later he was called to the newly founded university of Halle as professor of anatomy, surgery and practice, as well as of physics and chemistry. As a chemist he acquired lasting reputation by his numerous analyses of mineral waters, as well as by his investigations of the ethereal oils. In these studies he made the discovery of some special remedies, with which, like Stahl, he carried on a lucrative business (Liq. anodynus H.,[1] Elixir viscerale H., Balsamum vitæ H., Pilulae balsamicæ H. etc.). He was one of the most famous professors of his day, easier understood than Stahl (who was a more profound mind), and accordingly brought his youthful university into a most flourishing condition. All praised his fluent diction and personal amiability. In 1709 he was called away to Berlin as ordinary physician to king Frederick I., but met a downfall through the machinations of the physicians of Berlin, and particularly of a certain Gundelsheimer, whose name has survived in history as the representative of a bad colleague. He returned to Halle as professor, and scarcely left there until his death in 1742. Hoffmann was an extremely fortunate and busy practitioner, whom even Boerhaave declared his own equal. As the result of this declaration he recovered his reputation at the court of Berlin, and to such a degree that Frederick William I. sent his tall soldiers to him for treatment, and, on the occasion of the death of Hoffmann's wife, wrote him an autograph letter of consolation, saying that, after all, it was better that she should die than he, for that he could certainly do more good in the world than his wife could have done. Hoffmann was an extraordinarily voluminous writer. An edition of his Latin works comprises 27 octavo volumes. His chief work was entitled "Medicina rationalis systematica" (1718–1740).

The train of thought in Hoffmann's system is as follows: our knowledge is finite, rooted in the senses and limited to what is perceptible by the senses: all final causes, however, are inscrutable. Forces and influences beyond the range of the senses, cognizable by metaphysical speculation, lie without its limits. Forces are inherent in matter and express themselves as mechanical movements, determinable by mass, number and weight, an idea which has recently attained an extremely extended confirmation. In the body also these forces express themselves by movement, as action and reaction, contraction and relaxation, "tonus". Life is movement, especially movement of the heart: death, the cessation of the movements of this organ, as the result of which putrefaction begins. Death and life are mechanical phenomena. Health is synonomous with the regular occurrence of the movements; disease, a disturbance of the same. The contractions of the heart, the blood-vessels and animated fibres or tubules of Ruysch, set in motion the circulation of the blood, and effect regular secretion and excretion, the chief phenomena of health. Digestion is the solution of food by means of the saliva and warmth, perspiration an effect of heat alone, and takes place not only through the pores, but also through the smallest vessels of the skin. The body is precisely like an hydraulic machine. Its movements are effected and maintained by that dynamico-material principle, of fluid, but extremely volatile, constitution, "the æther" (synonomous with nervous æther, nervous spirit, "sensitive soul", the pneuma of the ancient physicians). This acts in accordance with the laws, not of ordinary mechanics, but of a higher and still uninvestigated science, and is in very small part derived from the atmosphere, but chiefly secreted from the blood in the brain. The "movements" of the latter organ drive it, by way of the nerve tubules, throughout the whole body. This motor principle possesses conception and sensation, and is the perceptive soul. It forms and maintains the body in accordance with its idea, and each special particle of it, like the monads of Leibnitz, has a conception of the composition and mechanism of the body. The chief reservoir and center of the æther is the medulla. It also circulates with the blood in the body. There is too a double circulation of the æther. The center of one is the brain, its periphery being formed by the nerves: the heart forms the center of the other, and the vessels form its peripheral organs. Both, however, are intimately associated. Disease may consist in too feeble, or too strong, tonus. Atony and spasm are the consequences, the latter expressed by pain in the nervous parts. Spasm arises from too strong, atony from too feeble, an influx of the nervous æther. Plethora too is one of the most frequent causes of disease. The latter act chiefly upon and from the primæ viæ, especially from the stomach, which displays special "sympathy", on the one hand, with the intestinal canal, and on the other, with the whole body. Hence it should be an object of constant watchfulness on the part of the physician. Fever, whose source Hoffmann seeks in the spinal cord, is a spasm of the arteries and veins, in fact a general spasm, a complete disease, not usually a salutary action, as Stahl taught. Occasionally, however, its effect is accidentally salutary.

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[1] This was first extolled as a panacea by the apothecary Martmeyer in 1710, and retains its reputation among the masses even at the present day.

"To excite a too strong, spasmodic contraction of the coats of the stomach and intestines by an emetic or cathartic, is in itself neither advantageous nor salutary. It is even a thoroughly unnatural action, and therefore a disease, which often produces very bad results. But when it carries off from these parts impure fluids, slimy and corrupt, it becomes in this way somewhat salutary. The same is the case also with internal spasms, which occasion spontaneous hæmorrhages. They may have a salutary effect when there is too much blood, and when they remove only the superfluity. But in itself this movement too is not healthful, for it frequently occasions fatal hæmorrhages. So it is also with fever. In itself considered, it should not be called beneficial or salutary, for it slays one-half the human race. But, under certain circumstances, it may be healthful, since it restores complete health, in so far as it removes the impurities which the patient's body contains."

In like manner inflammation depends upon spasm, and indeed spasmodic arrest, of the circulation in the inflamed part.

Hoffmann's therapy was simple and designedly poor in drugs (according to the ideas of that time), but by no means free from theoretical views. The physician has, before all else, to regulate the disturbed movements, for nature is frequently not able to do this. But there are diseases which cure other diseases; e. g. fever cures spasms. Hoffmann divided drugs (which he held worked under mechanical laws) into those which strengthen or weaken, alter or evacuate. He was especially partial to the use of his own remedies and wine, particularly Hochheimer, which he considered the best of all wines — as the English, at his instance, do at the present day. Camphor he strongly recommended; likewise mineral waters, cold water, Seidlitz salt, cinchona and iron. He often practised venesection, and laid great stress upon the observance of prescribed diet, e. g. absolute diet, milk diet, wine diet, exercise etc. Poisons he in general rejected; the preparations of lead he absolutely discarded for internal use, and desired to limit the employment of opium etc. How necessary at the present day is such an apostle against our poisons and drug-poisoning, particularly those regarded as antifebrilia! Evacuation, both upward and downward, he practised with the milder drugs only. His success at the sick-bed, and his reputation as a skilful physician, depend upon the simplicity of his therapeutics.

Among the followers of Hoffmann's system the professors of Halle, in regular succession, are particularly prominent. Of these the trustiest and most eminent was Joh. Heinrich Schulze (1687–1745), at first of Altdorf, then in Halle; Heinrich Bassi; Andr. Elias Büchner (1701–1769), successor of Schulze; Ernst Anton Nicolai (1722–1802), professor in Halle; Joh. Peter Eberhard, of the same university; finally Adam Nietzky (1714–1780), who followed the same road as Schulze from Altdorf to Halle. The æther hypothesis — Pietro Paolo Molinelli (1702–1764) thought he had demonstrated the existence of the nervous fluid by the swelling of the nerves after ligation — was especially defended by Christ. Mart. Burchart (1680–1742), professor in Rostock, who made use of *Leeuwenhoeck's view of the nerve-tubules*; Joh Phil. Burggrav of Darmstadt (1700–1775), professor at Frankfort-on-the-Main, the family physician of Göthe's father, who based upon the nervous fluid a kind of humoral pathology; and Joh. Ludwig Apinus (1688–1730) of Altdorf, who marched into the field with the Bible. The doctrine of the sympathies was especially elaborated in Holland by Hendrik Joseph Rega (1690-1754), of Louvain, and by Nic. Malcolm Flemyng,[1] particularly as regards the stomach. In England Browne Langrish (died 1759) was devoted to Hoffmann's doctrine, while in Italy Thom. Brini of Bergamo and Luigi de Clarellis, professor in Naples, combated it. Giov. Thom. Rosetti, professor in Venice, combined Hoffmann's doctrine with the Hippocratic idea of the "enormon", in opposition to which Charles Ferapié Dusieu and the notorious J. Paul Marat (1744–1793) stood by Hoffmann.

In relation with the system of Hoffmann and Haller's doctrine of irritability, which immediately after its origin was applied to theoretical medicine, there arose a system of pure pathological solidism, the

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[1] Flemyng was an English physician of Kington in Yorkshire, and a fellow-student of Haller in Leyden. His "Neuropathia, seu de morbis hypochondriacis et hystericis libri III." was published in 1740. (H.)

d. Nervous Pathology

of William Cullen (1712–1790), of Lanarkshire in Scotland.

Cullen was one of the first of those great English physicians who worked up from the deepest poverty, and whom posterity admires for their love of science and their services. First a barber, he then became an apothecary, next a ship-surgeon, then the surgeon of a small village, and finally alternated with William Hunter as a practising physician in Hamilton. As both these surgeons were in equally needy circumstances, they agreed (the solitary example among physicians!), in order to gain the higher education at which they aimed, that while one should by practice earn the necessary means, the other should attend the university. In this way Cullen was enabled to graduate in 1740. Six years later he became professor of chemistry in Glasgow, in five years more professor of medicine, and again after five years he came to Edinburgh, to pass through the same succession of positions. He continued there an active and famous teacher as long as he lived, but died, as he had begun his career, in poverty. His chief works were entitled: "Synopsis nosologiæ methodicæ" (Edinburgh, 1769); "Physiology for the use of the students in the University of Edinburgh" (Edinburgh, 1785); "First lines of the practice of Physic" etc. (London, 1777; written in English and therefore taxed with heterodoxy); "A treatise of the Materia Medica" (Edinburgh, 1789); "Clinical Lectures." Cullen was a very charitable man, supported the widow of Robert Burns and published his poems He was the father of modern Solidism, which he founded upon pure deductive principles.

The main foundation of Cullen's system is formed by the living solid parts of the body, not the fluids: the chief agent are the nerves. An undefined dynamic something, which is different from Hoffmann's material æther and the supernatural soul of Stahl, and which Cullen calls "the nervous force", "nervous activity", "the nervous principle", is the proper life-giving element. He also calls this principle "the animal force" or "energy of the brain", in which he also includes the spinal cord.

"An immaterial, reasoning substance or soul exists in the living man, and every thought must be considered a faculty of the soul alone. But this immaterial and reasoning part of man is united with the material and corporeal part, and especially with the nervous system, in such a way that the movements called forth in the latter beget thoughts. But thought, however generated, occasions new movements in the nervous system. This reciprocal influence I consider a fact, but I cannot explain how it takes place. Likewise the brain is the sensorium or corporeal organ, indissolubly united with the soul." (See Daremberg.)

The nervous principle produces spasm and atony. The former is not, however, always dependent upon increased nervous activity, but may also originate from feebleness of the brain, the center of nervous activity. The nerves are the conductors of the activity of the brain. Everything is effected through the brain and the nerves, and everything, including the causes of disease, works upon both of these. The causes of disease are chiefly of a debilitating character, but they awaken reaction and the healing power of nature. Fever is such a reparative effort of nature, even in its cold stage, and its cause is diminished energy of the brain, often united with a kind of insanity (delirium) due to a contemporaneous spasm of the extremities of the vessels, which produces a reflex acceleration of the heart and a stimulation of the arteries. The blood plays no part in fever, which is excited by weakening influences, e. g. fright, cold, intemperance, the emanations of marshes or human beings etc. Besides the spasm of the vascular extremities and the feebleness of the brain, there is also an accessory atony, which is propagated by sympathy to the tunics of the stomach and occasions the loss of appetite associated with all fevers. Both spasm and atony continue until the brain has recovered its ordinary activity, a result due to the increased activity of the heart, and recognized by the establishment of perspiration. Fevers are divided into the following classes:

1. Typhus, in which debility predominates;
2. Synocha, in which reaction predominates;
3. Synochus, characterized by a mixture of both the foregoing varieties.

Like fevers, Cullen divides all internal diseases into three categories. 1. Pyrexiæ (fevers, phlegmons, exanthems, hæmorrhages); 2. Comata (adynamia, spasms, delirium); 3. Marcores. A fourth class is formed by surgical diseases. This nosology was the cause of Cullen's reputation, especially in England.[1]

Cullen's explanation of the gout was famous. According to his view, this disease depends upon an atony of the stomach or organs of digestion, against which is set up periodically a reparative effort in the form of an inflammation of the joints. Gout is a general disease, but there is no gouty material. In scrofula, however, Cullen assumed, in contradiction to his nervous pathology, a peculiar acridity, and in putrid fever, a putridity of the humors etc.

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[1] Cullen is said to have been the first professor who delivered his lectures in the English language. Bard informs us that he also established a system of catechetical instruction, similar to what at the present day we call a "professor's quiz". His "Synopsis" appeared at Edinburgh in 1769, with many later editions. An American edition before me bears the imprint "Americæ (?), excudebat Abrah. Hodge, 1783." Cullen's complete classification of diseases is perhaps worthy of quotation, particularly as the reader would gain a very imperfect idea of it from the text. It is as follows:

Classis I. Pyrexiæ.

Ordo I. Febres.
Ordo II. Phlegmasiæ.
Ordo III. Exanthemata.
Ordo IV. Hæmorrhagiæ.
Ordo V. Profluvia.

Classis II. Neuroses.

Ordo I. Comata.
Ordo II. Adynamiæ.
Ordo III. Spasmi.
Ordo IV. Vesaniæ.

Classis III. Cachexiæ.

Ordo I. Marcores.
Ordo II. Intumescentiæ.
Ordo III. Impetigines.

Classis IV. Locales.

Ordo I. Dysæsthesiæ.
Ordo II. Dyscinesiæ.
Ordo III. Apocenoses.
Ordo IV. Epischeses.
Ordo V. Tumores.
Ordo VI. Ectopiæ.
Ordo VII. Dialyses.

Febres are divided into Intermittentes (tertiana, quartana, quotidiana) and Continuæ (synocha, typhus, synochus). (H.)

His therapeutics were simple, and, from his renunciation of the previous abuse of venesection, they were very salutary. "It is worthy of notice how valuable a good practitioner is in comparison with a bad theorist, when we distinguish the therapeutic prescriptions of Cullen from his theoretical explanations." He is fond of recommending strengthening and stimulating remedies (wine, cinchona etc.) and antispasmodics (opium etc.) against "spasm", frequently acting in contradiction to his theory, which may perhaps have been the secret of his success in practice.

The theory of Cullen, like most systems, soon acquired numerous followers. Some of these, however, departed at once and considerably from the views of their master, a kind of Nemesis with which all theories meet, and which is increased by the fact that pupils, for the most part, develop one side only of the doctrines of their master. The theory of Cullen spread far and wide, even into Spain. Prominent supporters of it in England were David Macbride (1726–1778), professor in Dublin; Samuel Musgrave (died 1782), an acute physician; the very eminent

JAMES GREGORY[1] (1758–1822) of Edinburgh, the successor of Cullen and a professor from his eighteenth year. He was of the greatest importance in the development of English medicine. He considered the muscles and nerves together a nervous element, which was excited by the blood. In spite of the fact that he discarded the acid and alkaline acridities, he appropriated some chemical ideas, adopting the theory of putrefaction etc. John Gardiner (about 1784) and others also embraced the doctrines of Cullen.

[Probably the most eminent pupil of Cullen in America was Dr. Samuel Bard of New York (1742–1821), of whom we shall have occasion to speak hereafter. H.]

In Italy Cullen's system was followed by Fr. Vacca Berlinghieri (1732–1812) of Pisa; in the Netherlands by C. G. van den Heuvel; in Switzerland by F. G. de la Roche (1743–1813) of Geneva; in Germany, above all, by the very famous Albrecht Thaer (1752–1828), who, to avoid living in constant contradiction with his conscience in consequence of professional fibs, abandoned the practice of medicine, because it promised more than it could perform, and often accepted more pay than was proportioned to the service rendered, and became the "Father of Husbandry." Chr. Fr. Elsner (died 1820), professor in Königsberg, also held the views of Cullen.

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[1] The eminent Scotch family of Gregory deserves a passing notice. James Gregory, F. R. S. (1638–1675), was an eminent mathematician, professor of mathematics in St. Andrew's and Edinburgh, and the inventor of the reflecting telescope in 1662. His nephew David Gregory, M. D., F. R. S. (1661–1701), was also professor of mathematics in Edinburgh and subsequently Savilian professor of astronomy in Oxford. His grandson John Gregory, M. D. (1724–1773), was professor of mathematics and experimental physics in the University of Aberdeen. James, the son of the last mentioned, was the eminent physician mentioned in the text, and his son William (1803–1853) was the famous professor of chemistry in Edinburgh. The "Conspectus medicinæ" etc. of Prof. James Gregory was published at Edinburgh in 1776. (H.)

Joh. Ulrich Gottlieb Schäffer (1753–1826) of Regensburg, son of Joh. Gottlieb Schäffer, a physician of the same place, showed himself a more independent Solidist or nervous pathologist. He distinguished in fever a stadium of excitement from a stadium of depression, regarding the former as corresponding to the stadium of crudity, the latter to that of coction. He also considered the so-called crises not as critical phenomena, but as results of the latter, and combated the theory of metastases, especially metastases of the milk. He accepted Haller's doctrine of irritation, sensibility etc.

Besides this system of pathological Solidism, humoral views were not wanting, though they were neither elaborated everywhere into a system, nor did they remain perfectly pure. A union of the doctrines of Hippocrates, Sydenham and Boerhaave was represented by the

e. Old Vienna School,

whose connexion with the political advancement[1] of Austria during the reigns of Maria Theresa and Joseph II. deserves at least mention. Its founder was baron Gerhard van Swieten (1700–1772) of Leyden.

Van Swieten was descended from a noble (Jansenist) Catholic family of the Netherlands, which at that time were united with Austria by a personal union, if such an expression is permissible. At the age of sixteen he attended the university of Louvain with the idea of educating himself for the public service, but returned thence to Leyden and began to study medicine under Boerhaave, whose favorite pupil he became. As the result of overwork he for a long period was subject to melancholy, and was unable to graduate until 1725. Although he had received a call to London with an annual salary of £1000, he remained at Leyden as a physician and private teacher (for as a Catholic he could hold no public professorship), chiefly on account of Boerhaave, until the death of the latter in his native city. When the archduchess Maria Anna of Austria had suffered an abortion he was called to her assistance, and gave such satisfaction by his skill that he was recommended by her to the empress Maria Theresa, her sister, who up to this time had remained childless. To the husband of the latter he gave advice (related by Hyrtl), which resulted in sixteen successive pregnancies, and as the result of his success came to Vienna in 1745 as ordinary physician and president of the General Medical Department of Austria. He was also appointed censor, a position in which he incurred much enmity, including that of Voltaire and especially that of the Jesuits, whom he robbed of their influence. Besides all this he was made a baron, and became, next to Kaunitz, the most influential counsellor of the empress.

His chief care — without holding the position of a professor he taught for nine whole years, and brought about the introduction of clinical instruction — from the outset was dedicated to the elevation of medical affairs in Austria, and especially to the improvement of the medical faculty. He had just attained his object when he died of senile gangrene, with the reputation of a great physician and a benefactor of Austria, especially of the poor. His chief work was entitled "Commentaria in Hermanni Boerhaave Aphorismos" etc., upon which he labored for thirty years. Van Swieten was of great service also in improving the treatment of syphilis, in which he (after the example of Theophrastus von Hohenheim and others) recommended the internal use of the sublimate. This recommendation, however, depended more upon Maximilian Locher, physician to the St. Marcus Hospital, than upon van Swieten's own personal experience (Proksch).

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[1] The most brilliant fruit of this was undoubtedly the Vienna school of music of this period, with Haydn and Mozart at its head! Literature, on the other hand, presented a rather bare appearance. In return — and it is a characteristic of German development to manifest its florescence in diffeient localities — literature in North Germany attained at this period its highest development in Lessing, Goethe, Schiller (Bach remained, indeed, without immediate influence). The condition has been reversed in our century from 1830 downward: music has displayed a new bloom in North Germany (Weber, Mendelssohn, Spohr, Wagner etc.), literature in Austria (Grillparzer, Lenau, Anastasius, Grün etc.). Bach was, as it were, newly discovered by Mendelssohn.

Concerning the priority in the use of this sublimate treatment (it was customary among the common people of Siberia even in the 17th century) a dispute arose between van Swieten and the Portuguese Anton Nunnez Ribeiro Sanchez (1699–1783), whose life was one continual adventure. In his youth he ran away from his uncle, who, with the object of giving him the hand of his daughter, wished to keep him away from medicine. Subsequently he studied in Coimbra and Salamanca at the expense of a physician. Practising for a time in his home until he could endure it no longer, he went to Genoa, London, Paris and Montpellier to continue his studies, and finally came to Leyden. From this place he was, at the instance of Boerhaave, called to Russia. Here he was at once appointed a military physician, and sustained himself in the position of physician-in-ordinary (for syphilis?) under the dangerous rule of various amorous empresses, until he too finally experienced a fall. He went next to Paris, where he continued to live in retirement until his death.

More eminent as a physician, than for his personal character was

Anton de Haën (1704–1776), of the Hague. He also was a pupil of Boerhaave, who was the only physician whom de Haën did not abuse, while despising almost everyone else. At the suggestion of van Swieten he was called in 1754 to Vienna as president of the clinic in the city hospital, which contained six beds for men and six for women! De Haën was the proper founder of the so-called old Vienna School, whose chief merit — in striking contrast to the so-called New School — is to be sought in its practical and diagnostic services, as well as in its generally sober observation. All these existed, it is true, in the mother-school of Boerhaave (if we can speak of such a school), and were derived, like its founder, from that school. Still the daughter at Vienna was more sober and kept herself more exempt from systematic tendencies than did the mother in Leyden.

Thus the simplest possible treatment, united with careful observation, was the fundamental principle with de Haën. Like Hippocrates, he laid great weight upon Semeiology, and also followed this model e. g. in the frequent prescription of barley-water and oat-meal gruel ("ptisan") in fevers, as well as in the administration of acidulated drinks and drinks prepared with honey, in absolute diet, cool surroundings, good air etc. Nature was not to be disturbed by medicines of a powerful action. Hence de Haën would administer emetics and cathartics only rarely and "at the right time", an improvement so much the greater as at that period it was customary to begin the treatment of all febrile deseases with the exhibition of an emetic, followed by a cathartic every second day. In a practical point of view he divided diseases into benignant and malignant, enumerated the varieties of both classes, determined the individual character of each, adopted the doctrine of critical days, but conceded that "with the exception of ephemeral fever, every disease might be malignant, and except the plague, every one might be benign." He warmly embraced hygienic and prophylactic views, and accounted medicine quite as useful to the state as to individual patients. Like Pettenkofer too, de Haën calculated the gain or loss to the social economy of each state accruing from the health or sickness of its citizens. He likewise reintroduced the thermometer, and demonstrated that in the cold stage of fever an elevation of temperature, often very considerable, occurred. His spirit of contradiction, which impaired the influence of such doctrines and his personal reputation, was the secret of de Haën's opposition to inoculation and to Haller's doctrine of irritability. His defence of the existence of witchcraft, on which he wrote a special treatise, sprung from his own superstition and that of his age. His chief work was entitled "Ratio medendi in nosocomio practico" etc., 15 volumes (Vienna, 1758–1769).

As de Haën quarrelled like a savant with everyone, of course he could not fail to do so with

ANTON STOERCK (1749–1803), the successor of van Swieten in the direction of the Austrian Medical Department.

Stoerck, a native of Sulzbach in Swabia (the son of a blacksmith, whose brothers Melchior and Matthæus were also physicians in Vienna), was never a teacher but simply an official and a bureaucratist, and as such bound medical instruction in the fetters of the strictest educational red tape.— In practical medicine he made himself specially serviceable by his careful investigations and experiments in pharmacology and toxicology (like William Alexander, a contemporary in Edinburgh, who also instituted the proving of drugs upon healthy persons). Stoerck was a follower of the views of De Haën.

MAXIMILIAN STOLL (1742–1787), also a Suabian and a famous clinical teacher, departed widely from these views, so that he might be called the "Systematist" of the old Vienna School. He was especially an epidemiologist.

Stoll, the son of a poor village barber of Erzingen in Suabia, was to have been educated (as was the usual custom of the guilds in the 18th century) from his 9th year in the same calling. But he took an insuperable repugnance to this arrangement, and so, after a preparatory course of four years in the Latin school of his native town, gained admittance into the school of the Jesuits at Rottweil, where he was persuaded to enter the Jesuit order (1761). He was at once sent as a teacher to Ingolstadt and subsequently to Hall in the Tyrol, but in consequence of his liberal views was transferred thence to Eichstädt. In 1767 he abandoned the order, and went first to Strassburg and then to Vienna to study medicine. Here he became a pupil of de Haën and graduated in 1772, whereupon he went to Hungary as a practising physician and remained there until in 1776 he was appointed the successor of his old teacher. In Hungary he had discovered that the treatment of "gastric fever" by venesection was inferior to that by emetics, and upon this he founded his gastric theory. In his new position he lectured with great popularity, until in 1784, upon the completion of the "Allgemeines Krankenhaus", he fell into the background and received ten beds in two rooms in a little outhouse in the court-yard.[1] He was still subjected to the intrigues of his enemies, and his wife too embittered his life: in fact the vixen had him buried in the dress of a Jesuit in order to injure his reputation even after death. His chief works were entitled: "Ratio medendi etc" (1779–90), "Aphorismi de cognoscendis et curandis febribus", "Praelectiones in diversos morbos chronicos" (1788).

Stoll too did not form a complete system, for he laid too great weight upon careful observation. Hence, like Sydenham whom he highly esteemed, he made the epidemic constitution a matter of very great importance. The results of his therapeutics, however, led him to the view that faulty humors, especially in the primæ viæ, so-called "gastric", and above all "bilious impurities", were the chief causes of disease. He divided fevers into stationary, annual and semiannual, bilious, inflammatory, intermittent, epidemic, milk fever, mucous fever, hectic etc. Chronic diseases were also the subject of his careful observation.—For the removal of the supposed "gastric impurities" — with which the later gastroentérite of Broussais is in remarkable accord — Stoll made extensive use of emetics as well as laxatives, in order that these impurities might not pass into the blood ("antigastric method"). Moreover he called in the aid of so-called "concealed inflammations", because (probably partly as the result of his therapeutics) he often found such in the bodies of his patients, without their having been demonstrable during life. In the detection of these inflammations he laid great weight upon pathological anatomy, which de Haën had already recognized. — How little of the Dogmatist there was in his composition may be inferred from the fact that when, in consequence of a change in the "constitution of disease", his original therapeutics became no longer useful, towards the close of his life he abandoned them entirely.

Still his therapeutic system flourished for a long time in ordinary practice, which the farther it limps behind the position of actual knowledge, the more readily it ever adapts itself to each short-lived fashion. The Skoda of the Old Vienna School was Auenbrugger, whom we shall consider in another connexion, for, with the exception of Stoll, this school entirely ignored him.

Well known physicians of the "Old Vienna School" were: Stoll's successor Jacob Reinlein, who came from the school of surgery to the university; Joh. Georg Hasenohrl (Lagusi, 1729-1796) of Vienna; Adam Chenot (1721–1789) of Luxemburg; Melchior Störck (died 1754); Cranz (materia medica, medical botany, mineral waters); Marcus Anton von Plenciz (1705–1786), of Salcan near Gorz, and his son Joseph Plenciz (1752–1785), professor in Prague;[2] Jos. Sautter; Pasc. Jos. Ferro (1753-1809) of Bonn, in Vienna; Wenzel Trnka von Krzowitz (1739-1791), professor in Ofen; Stephan Weszpremi and others.

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1. Stoll proposed a number of small hospitals, Quarin one large one only. Quarin was victorious, and received the position of director in advance of the completion of the "Krankenhaus".
2. The elder Plenciz was a supporter of a *contagium animatum*, but assumed for each individual disease a special "*seminium verminosum*", with varieties which produced the individual forms of the same diseases. Only in this way could the diffusion of contagious diseases through the air, their stadia etc. be explained (Loeffler).

If the system of Stoll occupied itself especially with the bile and mucus of the old Dogmatists, in the equally humoral

f. Theory of Christoph Ludwig Hoffmann

(1721–1807), of Rhoda in Westphalia, first ordinary physician at Cologne, then in Mayence, the irritability and sensibility of Glisson and Haller were intimately mingled with the "putridity" of the Pneumatists and the "acridities" of Sylvius and Boerhaave, though the two latter were the predominant principles. As the method of Stoll was called the antigastric, so we may speak of Hoffmann's as the "antiseptic". He assumes in conditions of health ten different grades of irritation, besides combinations of these and reflexes to the internal organs, e. g. the intestines, bladder etc. In diseases, and especially in fevers, septic or acid products of decomposition in the blood (and the septic particularly) act as irritants to the solid parts. In man everything is "septic", the urine of healthy persons, the sweat, the air of respiration, the fæces etc. These are excreted in order that a man may remain in health. In disease also this acid putrescence is removed, a conclusion which we may draw from the sour odor of the mouth in invalids. In scorbutus the putridity has its seat in the bones; in the hypochondriac, in the intestinal canal etc. The treatment and the remedies should both be antiseptic etc. Hoffmann was very famous in his day, so that even Goethe's friend Karl August von Weimar submitted to his "antiseptic" treatment (for syphilis or gonorrhœa!), and praised him very highly.

Immense use of the humoral views was made in the clyster-theory, which deserves notice merely in an historical point of view as one which would have become the mediæval or old Indian midwives, but which illustrates equally well the thoughtlessness of the public and the ready credulity of physicians. I refer to the theory known as

g. The Doctrine of Infarctus.

This had its origin with the Hesse-Homburg physician-in ordinary, Johann Kämpf (died 1753), or his son of the same name (lived 1726–1787), who published the "doctrine" of his father about 1780.

By "infarctus" Kämpf understood substantially impacted fæces, which he thought originated in thickening of the humors in the portal vessels and intestine, "when the former become filled, stuffed and distended, universally or in places, by the blood delayed in its circulation and finally stagnant, coagulated, badly mixed, variously corrupted, robbed of its fluidity, thick, viscous, polypous and solidified, or when the thickened serum of the same, in the glands, the cellular tissue and the digestive passages, accumulates, putrefies, dries and takes on many kinds of decomposition." There are two kinds of "infarctus", the black-bilious and the mucous. These are of varying consistency, from soft as mucus to firm as flesh, or indeed as hard as stone, and they are so dangerous that they must be expelled, even if this should require for years three daily efforts *infra et à tergo* in the form of the appropriately named "visceral-clysters". From this theory a wide-spread clyster-fashion developed. Lords and ladies vied with each other in belaboring their infarctus and in practising visceral clysterization. We cannot deny to the author of this doctrine at least an extensive knowledge of human nature. He supplied a universal remedial procedure, and gratified the apothecaries[1] by the bulkiness of the herbs required for its practice.

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[1] In "Le malade imaginaire" Argan finds in his apothecary's bill the following item: "Un petit clystère insinuatif, préparatif et remollient, pour amollir et rafraichir les entrailles de monsieur" — a refinement of clysterization quite equal to the theory of Kampf. Phillippe furnishes us with much amusing information

The preparation and administration of clysters afforded technical "work" for the hands of the laity, furnished them occupation and diversion, concentrated attention also upon the one partie honteuse; mucus etc. from a rectal catarrh, the result of protracted clysterization, or a "hardened" ball of fæces could result only in the triumph of the theory, unless the patient bade adieu to all things temporal under the influence of his favorite clysters!

Besides the son of Kämpf already mentioned, Dan. Emil Koch, Jos. Georg Schmid, Theodor Brotbeck, W. L. Kämpf and others wrote on the subject of infarctus Tissot and Zimmermann also — the latter, indeed, induced only by his own suffering — found the method good at the least.

h. The School of Montpellier,

the representative of so-called "Vitalism", struck out an entirely different path from that of the Vienna school. This system was inaugurated by Théophile de Bordeu (1722–1776), although he did not yet employ the term Vitalism.

Bordeu was born at Iseste in Béarn and studied in Montpellier, where he graduated in 1744. Afterwards he taught anatomy in Pau, but speedily removed to Paris. In 1749 he was appointed director of the Pyrenean baths, but he returned to Paris in 1752, where he began a quarrel with the famous Faculty of Paris, by which the honorable men Bouvart and Thierry finally succeeded in having him turned out of that body, on the charge of having robbed a patient. Thus the Faculty preserved its traditions, and Parliament was again compelled (1764) to indemnify Bordeu for its sentence. He died in the enjoyment of a great reputation, but without having become reconciled with his "colleagues". Bordeu belonged to the most zealous defenders of inoculation. His chief works were entitled "Récherches anatomiques sur les différentes positions des glandes et sur leur action" (Paris 1752); "Chylificationis historia"; "Récherches sur le pouls par rapport aux crises"; "Dissertation sur les écrouelles" etc.

Bordeu maintained the existence of a general life of the body, which resulted from the harmonious working of the individual lives and individual powers of all its organs. The organs of the body are associated with each other, but each has its definite functions as well as position, and is, as it were, a creature within a creature, a sort of archæus. The most important organs, however, are the stomach, the heart and the brain — the "Tripod of Life". These regulate the life of the other organs. From them proceed sensibility and motion, the two chief phenomena of life, by which the animal organism is widely separated from inanimate objects, and to them also return these qualities after the completion of their circulation throughout the body.

The nerves are the chief organs, which, in union with the brain as their center and supplied by it in the best manner possible with vital force, distribute and regulate motion and sensation throughout the body, but do not work in conformity with chemical and physical laws. The stomach presides over nutrition, the heart propels the blood and chyle throughout the body. Health is the undisturbed cir-

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relative to syringes and clysterization, among the rest the following witty epitaph upon an apothecary:

"Ci-git qui pour un quart d'écu
S' agenouillait devant un cu." (H.)

culation of motion and sensation from and to the three centres of the body. There is, however, no such thing as absolutely perfect health, for it fluctuates from moment to moment. There is only as near an approximation as possible to a uniform circulation of the kind mentioned. The greater or less perfection of this circulation occasions in individuals the differences of temperament. Secretions and excretions, sleep and waking, muscular activity, the employment of the external and internal senses, all are subordinated to these three chief organs, and are sustained and maintained by these. — The glands are of special importance in the economy of the body. Their secretion always originates from a nervous excitation; indeed the nerves close and open, as it were, the pores of the glands.

In pathology Bordeu laid great weight upon the crises. Every disease, having passed through the stadium of irritation and coction, is decided by such a crisis. Correspondingly, therefore, diseases may be compared with glandular activity. Crises too, for the most part, proceed from the glands. From the importance which Bordeu ascribed to the latter organs he was led to lay down the existence of salivary, milk, bilious, urinary, spermatic, lachrymal, perspiratory etc. cachexiæ.

Bordeu's theory of the pulse is worthy of remark.

It was influenced by that of the Spaniard Franc. Solano de Luquez (1685–1738), born at Montilla near Cordova, died a practising physician in Antequera. The latter had discovered the "dicrotic" pulse, which he considered prognostic of nasal hæmorrhage. His doctrine was made known by James Nihell,[1] a physician of Cadiz.

Bordeu laid down a critical and non-critical, a simple-critical and compound-critical pulse. Next he distinguished a superior and an inferior pulse, separated by the diaphragm. The superior again is divided into nasal, tracheal and thoracic; the inferior into gastric, renal, uterine, seminal etc. The uterine pulse indicates the approach of menstruation; the renal, speedy urination etc.

Of course even such doctrines found their followers, as well as hearty opponents, and the latter were the special occasion of Bordeu's expulsion from the Faculty.

Bordeu's therapeutics aimed at the promotion of the crises, which, in chronic diseases, where they do not so readily appear of themselves as in acute, he favored by the use of stimulants, among which the mineral waters of the Pyrenean springs were particularly useful.

Bordeu's most intimate friend, the Gascon Louis de la Caze (1703–1765), found in the diaphragm and the membranees of the brain, and generally in the cellular structures to which Bordeu ascribed "tonus", the chief seat of vital activity, and he held that from Adam down the semen contained the archetype of mankind, just as Bouchut has done in more recent times, though the latter gives another name to the matter. Henri Fouquet (1727–1806) elaborated especially Bordeu's doctrine of the pulse and even assumed a "skin-pulse", which indicated sweating. The same doctrine was professed by Ign. Jos. Wetsch (1737–1779), a professor in Moscow, and even by C. G. Gruner.

The god-father, as well as the most important representative of

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[1] James Nihell was an Irishman, practising in Cadiz, who had familiarized himself with the views of Solano, and published them (London, 1741) in a treatise dedicated to Richard Mead. (H.)

"Vitalism", was Paul Jos. Barthez (1734–1806) of Montpellier, a man of as ingenious gifts as he was eager for knowledge and desirous of truth.

In the preparatory schools Barthez at the age of ten years had proven himself more than a match for his teachers, so that he was compelled to leave them. He first studied theology, but in his sixteenth year exchanged this for medicine, which he studied first in his native city and then in Paris. At the close of his course he went on a military campaign, was then made editor of the "Journal des Savants", and at the age of twenty-seven became a professor at Montpellier, whose medical faculty acquired great reputation from his presence. Dissatisfied with medicine, Barthez next devoted his attention to the law, and in 1780 had attained the position of counsellor of justice, when he abandoned this career also and turned his energies next to the study of philosophy. In 1785, however, he accepted the position of chancellor at Montpellier, an office which ministered to his vanity and inordinate ambition. During the Revolution he associated himself with the aristocratic party, and when the Faculties gave place to the Schools he was not reappointed, so that he practised until 1796 in Narbonne and Toulouse. Subsequently he returned to Montpellier and was appointed consulting physician by Napoleon in 1802. In 1805 he went to Paris, where he died the year after his arrival. Barthez was the de Haën of the school of Montpellier. His chief works were entitled: "Oratio de principio vitali hominis" (1773); "Nouveaux élémens de la science de l' homme"; "Nouvelle mécanique des mouvemens de l' homme et des animaux"; "Traité des maladies goutteuses". He was a voluminous writer.

Barthez names "vital principle" simply "the cause of the phenomena of life in the human body". Its nature is unknown, but it is endowed with motion and sensibility and is different from the thinking mind. He considers it something abstract, but yet allows to it also the properties of something real, and endeavors to demonstrate its existence (as Bouchut did that of his "vitalis agens") by the à posteriori method. Plants likewise possess it. This "vital force" is found everywhere and in all parts of the body, but cannot work separately for any considerable period in any one of those parts, being transferred speedily by sympathy to all the others. From it originate "the muscular and tonic forces, the general and special sensitive forces, animal heat and the sympathies."

Disease is the result of an affection of the vital force. Every disease, however, is divisible into certain "disease elements", viewed as parts of a whole, which we call disease. These elements again are divisible into "secondary elements". Thus inflammation e. g. may have even an element of a complicated fever, another element of pain, another of irritation etc. These primary elements, considered in themselves and not as parts of the whole, i. e. "the disease", are called "status or état", and thus we speak e. g. of the bilious, inflammatory, dynamic etc. status. Descending to details, Barthez explains nervous diseases by an enfeeblement "of the whole system of powers of the vital principle". On the other hand, the "putrid fevers" are "specific vital fermentations tending to corruption"— an explanation in which humoral views manifest themselves. The intermittent fevers, on the other hand, are ascribed to the lack of a special force called the "stability of energy", and finally the dangerous or malignant diseases exhibit a diminution or absolute loss of this force. — Barthez laid great weight upon the indications; indeed, in his view, medicine itself is merely the science of indications. Thus he became necessarily the creator of the "natural, analytic and empiric method of treatment". The first of these consists in following the hints of nature, e. g. giving an emetic in cases of nausea; the second in seeking out the "elements of the disease" and treating each of them separately; the third removes diseases by means of remedies learned from experience, including here the specifics. The last method is to be employed when the reparative efforts of nature cannot effect the cure, and when the analysis into the "elements" does not succeed.

Jean Charles Marguerite Guillaume de Grimaud (1750–1789) of Nantes, professor at Montpellier and teacher of Charles Louis Dumas (1765–1813) of Lyons, also a professor at Montpellier, was a pupil of Haller and Barthez He assumed three fundamental forces: the vital, the assimilating and the opposing. He divides diseases into those which originate from modifications of these three forces, from chemical, physical or vital changes in the fluids and solids, and those which arise from constitutional predisposition. The surgeon Anthelme Balthasar Richerand and Franc. Chaussier (1746–1828), professor of physiology and a popular practitioner in Paris, were "vitalists", though the latter became subsequently a partisan of Broussais. Finally Cabanis was also a vitalist in Barthez's sense of the term.

In Germany the chief representative of the so-called vitalistic theory, which comes frequently into collision with the materialism (force and matter) of the present day, was the

i. Doctrine of Vital Force,

which the ingenious and versatile Joh. Christian Reil (1759–1813) elaborated into a system, though he was not the first to advance it.

Reil was born at Rhaude in East Friesland, where, after finishing his studies in Halle and Göttingen, he practised for several years. He then — it is said in consequence of disappointment in love — went to Halle, and there qualified himself for the office of a privatdocent. Here in 1787 he became professor of medicine, and continued to hold this chair until called in 1810 to the same position in Berlin. In 1813 he undertook the management of the military hospitals at Halle and Leipzig, but soon succumbed to typhus fever. His chief works were: "Exercitationum anatomicarum fasciculus I. de structura nervorum"; "Über die Lebenskraft"; "Entwurf einer allgemeinen Pathologie"; "Ueber die Eigenschaften des Gangliensystems und sein Verhältniss zum Centralsystem"; "Ueber das polarische Auseinanderweichen der ursprünglichen Naturkräfte in der Gebärmutter zur Zeit der Schwangerschaft und deren Umtauschung zur Zeit der Geburt"; "Archiv für Physiologie" etc. Reil's son was a physician in Cologne, though he did not practice but devoted his whole life to experiments, after the manner of Santoro.

According to Reil's doctrine, the "vital force" is connected with form, composition and original diversity of matter, and is inseparable from the latter. By reason of this dependence upon form and composition, and during the activity of the organs, it is subject to constant changes according to age, season, the time of day, habits etc. Each organ has its own special force, but it is united by sympathy with the rest of the body

Besides the force inherent in, and flowing out of, matter, there exists nothing but ideas. The final cause of both, however, is inscrutable.

"The foundation of all the phenomena of the animal body which are not ideas, or which are not associated with ideas as cause or effect, lies in animal matter, in the original diversity of its fundamental substance, and in its composition and form."

But to call forth the phenomena of vital force matter demands certain — imponderables — such as heat, light, electricity and other unknown substances, which unite, but are not intimately mixed, with it and are simply accidentia. Organic nature has the pre-eminence over inorganic, because it possesses the capacity for generation and regeneration. The body assimilates foreign matter and gives to it the appropriate form. A genus always creates the same genus and the kind is immortal. Individuals alone change. The formation of the animal body begins in a formative germ, as the result of "animal crystallization" and attraction. The fundamental form of crystallization is the "fibre", to which belongs "irritability", that is to say that property of animal matter by which, as the result of external irritation, it of its own motion changes its present condition. The cause of irritability is again form and composition. The irritations for each organ must be specific, corresponding to the powers of the organ. The grade of irritability alone varies. Disease is an aberration of form and composition.

"Changes of composition are the basis of all the manifold phenomena in conditions of health and disease, and in these lies the proximate cause of diseases. Remedies are effective only so far as they remove the morbid changes of composition and establish healthy ones."

Reil's theory of fever — febrile in his view was synonomous with "acute" — is still recognized at the present day. He also rendered service to the theory of inflammation, which latter he declared a disease of the blood-vessels, that is of the capillaries and vascular plexus found between the larger arteries and veins. His chief and most enduring service, however, was rendered to psychiatry, especially its practical department, inasmuch as he pleaded for the abolishment of mediæval maltreatment. In later days he changed over to natural-philosophical views, of which the ideas already adduced must be considered the precursors. He then identified the vital process with galvanism: it is a potentized galvanism. Irritability and sensibility correspond to the poles, the former to the positive, the latter to the negative pole. Every organ manifests "polarity". The diaphragm is the indifferent point of the body. "Tension" prevails everywhere between organic and inorganic matter and beings, and between these and the external world. Death arises from an electric shock, by which a neutralization of the "tensions" is accomplished etc.

A number of the doctrines of Stahl, Hoffmann, Haller, Brown and of the vitalistic system are found in the

k. System of E. Darwin,

which appeared in 1794. Erasmus Darwin (1731–1802)

was born in Nottinghamshire, and studied in Edinburgh. Subsequently he practised in Lichfield, Radbourne and Derby, and distinguished himself, not only as a physician, but also as a poet, philosopher and physiologist. He was the friend of James Watt, the creator of our modern industrial and commercial advancement (and of modern pauperism). Darwin in 1788 sung Watt's labors as those of a new Columbus: "Soon will the power of steam bear the fleet carriage along the road, soon will it bear the bark, with certain course, through the billows. Probably too it will, like the eagle, bear a new car through the kingdom of air on the nimble pinions of the wind to remote bounds", all of which has been literally fulfilled. Of Darwin's life it is said that by his practice and two fortunate marriages he became wealthy, "ate much and drank nothing but water". His chief work was entitled "Zoonomia, or the Laws of Organic Life" (1794).

According to Darwin there are two fundamental substances; spirit and matter. The principle of life is motion, of which there are three kinds: vital movements due to external irritation, e. g. the movement of the blood and locomotion; primordial movements; chemical movements. In the body there exist sensorial and fibrous movements. The former include the senses and the nerves, as well as the movements of the vital spirit, which are not lacking even in plants, and express themselves as irritability (whose action is irritation), sensibility (sensation), will-power (volition) and the power of association (association). The fibrous movements may be movements of irritation, sensation, volition and association. The varieties of disease are homonymous with these four categories, and each of them has again subordinate divisions. Remedies are divided into those which sustain the movements of irritation, those which increase them, those which restore them, and finally those which diminish them.

A degeneration of the doctrine of vital force, or rather an illusion genetically dependent upon the latter, and (where any effect is manifest) to be referred to hypnotism or hysteria, is the silly theory of

1. Animal Magnetism,

which attained among the great and small, the educated, or rather miseducated and uneducated, a following which would be incomprehensible, did we not know the tendency of mankind to the marvellous. It must be ascribed to that inclination which finds its highest expression in religious extravagances, its most common manifestation in such cognate and silly phenomena as animal magnetism. Witchcraft and magic, thousand-formed, thousand-armed, "widely diffused and old as the human race, as they were the first, so will they be also the last forms of the healing art! They are continually renewed under new forms adapted to the time — for us under the guise of science and called Mesmerism. . . . . Even in the family of the educated physician the private advice of the old washerwoman possesses more value than his own art" (Chemisso).[1] Such expressions from time to time rise to the proportion of spiritual epidemics. They have always appeared especially during and after periods of political disturbance, misfortune, over-excitement and miseducation in the higher strata of society, and spread thence to the masses, and have always stood too in causative connexion with the internal development of the life of the people.

Franz Anton Mesmer (1734–1815), of the village of Itznang, near Radolfzell on the Lake of Constance, was originally (like almost all such enthusiasts) merely a partial victim of this romantic yearning. Subsequently, however, he posed as the apostle of a new doctrine, designed to furnish a living for its founder, and finally ended as a simple "impostor". He had studied in Vienna, where, in his graduating thesis (probably at the mystic suggestion of de Haën), he had already occupied himself with the influence of the planets upon man and with the use of the natural magnet. The latter he subsequently employed in his practice, but he likewise found that the simple hand was effective — a member which, as an organ of sense, the theurgic professor Leupoldt of Erlangen believed to be associated with the mind, and therefore specially adapted, not only for blessing and the imposition of hands, but also for the strengthening of personal relations, particularly between individuals of different sexes, with or without reference to sexual life. Mesmer, on the other hand, held that the magnetic "fluidum" (seminale?) existing everywhere throughout the world, and of course in man likewise, overflowed from the hand with a healing influence upon others, and that the sick were peculiarly susceptible to this influence. In the year 1774 he published his experiments and travelled in the prosecution of his studies. Returning from his travels, he erected a private institution, where in the beginning he discreetly treated only fidgety and blind maidens and old simpletons. His deception, however, was unmasked by a commission appointed by Maria Theresa, and he was compelled to leave Vienna within 24 hours. This martyrdom recommended him in Paris, where he came in 1778. Here he had the good fortune to win over to his views d' Eslon, ordinary physician of the count d' Artois, and a member of the Faculty, who, to Mesmer's chagrin, began at once to magnetize on his own account. The thing became fashionable, and an effort was now made to obtain a number of suitable witnesses by all sorts of underhand practices. This plan, however, proved a failure, and the two companions fell out with each other. Mesmer went for a long time to Spaa, but returned when a respectable number of students had been obtained in Paris. These he undertook to instruct in magnetization at the rate of 100 louisd'or a head. For the elevation of the whole he founded the "Order of Harmony" and established so-called "baquets", i. e. magnetic tubs, half filled with sulphurated water and all kinds of ingredients, from which projected iron conductors. Upon these conductors hung a ring, with which the conclave, whose members joined hands, placed themselves in contact. D' Eslon had similar tubs and a "Crisis Hall". At these séances Mesmer was clad in lilac-colored clothing and reinforced the action of the tub by looks, gestures, playing upon the harmonica and touching the patients with a wand or with his fingers. If any one, 'chiefly a lady", had a "crisis", she was at once borne to the crisis-chamber by Mesmer himself, and during these feminine crises he alone was permitted to enter the room, as he only had success in their "treatment". The séances were very popular, and in a short time brought Mesmer in 40,000 francs. The charlatan was able to deceive even the queen, and when he threatened to deprive France of his presence she had him offered a salary of 40,000 francs to instruct physicians in his art. But the wily fellow declined to enter into the bargain. In the year 1783 an old simpleton again wrote an article extolling Mesmer as a worker of miracles, the result of which was that the commission of investigation, so often desired by his ill-wishers, was appointed, and its adverse decision, together with some important preliminary events, drove Mesmer from the field. During the Revolution he lost part of his wealth, and in 1798 he returned again to Paris. But his day had passed, and thenceforth until his death he lived forgotten, sometimes at Frauenfeld in Thurgau, sometimes in Constance, and finally in Meersburg on Lake Constance.

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[1] An earlier remark of the same author is still true: "I wish to give offence to no one: but who will deny that even to-day, in an enlightened city like Berlin, more diseases are treated with charms or sympathetic and miraculous remedies, than are entrusted to the care of the scientific physician?" (Reise um die Welt).

Just as the lustre of animal magnetism began to appear two noble brothers Puységur, — faith and superstition are, indeed, aristocratic, for they maintain ignorance and obedience—established in southern France a mongrel sort of magnetisation, practised after the style of the Druids in the open air beneath the dense foliage of the forests. They, however, made no effort to produce violent crises, but sought by gentle "manipulations to produce agreeable frames of mind", terminating finally in clairvoyance. In 1785 they also established branch associations in Strassburg. In France Virey, Lombard and others were opponents of the delusion.

Two years later, through the "prophet" Lavater, the craze reached Germany. Here the physicians of Bremen, including especially Arnold Wienholt (1749–1804) and Olbers (1758–1840), the discoverer of the asteroids "Pallas" and "Vesta", headed the line. They were followed, among others, by Eberh. Gmelin (1753–1809), J. N. Pezold, Joh. Heinnecken, Joh. Lor. Böckmann, who even edited an "Archiv für thierischen Magnetismus" (even Alex. von Humboldt inclined to this theory), A. E. Kessler (born 1784), who asserted the polar behavior of the magnetiser to the somnambulist, in which the former represented the positive and active, the latter, the negative and passive pole; C. Chr. Wolfart, (1778–1832), professor A. F. Kluge (a special Berlin authority on animal magnetism, whose "Versuch einer Darstellung des animalen Magnetismus" was printed as often as Virchow's "Cellularpathologie") and Hufeland in Berlin; the natural-philosophical physicians Eschenmayer, Kieser and Nasse, the former of whom even driveled about a "spiritual generation" between the magnetiser and the magnetised; Walther, professor in Landshut, the eminent surgeon J. Ennemoser (1787–1854), who, however, took up the matter more from the physical stand-point; J. C. Passavant in Frankfort-on-the-Main; Ritgen in Giessen, who "magnetized" young nurses particularly; Franz. Ant. Nick (1780–1832) in Stuttgart; Joh. Jul. Voss (1768–1832), and many others down to the very assistants of the apothecaries. Göthe thought: "The matter is neither entire nonsense, nor yet absolute deception. Only the men who devote their attention to it are very suspicious characters to me: mountebanks, great lords, prophets, all men who like to boast on very slight grounds" etc.

Among the opponents of magnetism were the judicious Stieglitz, one of the clearest heads that ever cultivated the medical sciences; Hensler, Pfaff etc., including the best physicians. Stieglitz was answered by Wolfart and J. E. L. Ziermann.

These mystic medical doctrines were continued by Justinus Kerner (1786–1862), Christ. Gottf. Nees von Esenbeck (1776–1858), of Erbach in the Odenwald, and Joh. Nepom. von Ringseis (1785–1880) of Munich, an ingenious man, but sunk in the mysticism of the 18th century and the romance of the 19th, and through the influence of both a devoted Catholic, who thought: "Since disease is originally the result of sin, it is incomparably safer (though according to experience not always indispensable) that the physician and patient should purify themselves before beginning treatment", and the Church accordingly supplies the necessary disinfectants in auricular confession etc. In a somewhat extensive practice, however, these measures cannot be very well employed. We should also mention Albert Steinbeck, Werner and others — proof enough that even down to our own skeptical age the spirit-world has haunted medicine. Under this head falls too the "Od" of baron Karl von Reichenbach (died 1869), the discoverer of paraffin and creasote. The "Od" was something between magnetism and electricity, appreciable only through the nerves. The most recent manifestation, however, is the modern "Spiritualism", which counts its followers even to-day among nobles, humbugs (an Austrian archduke in 1884 outdid both) and even professors. Hence the rehabilitation of Mesmerism[1] in the form of "metalloscopy", according to the claim of the physiologist Schiff (1879), put on the airs of a "science".

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[1] The "Hypnotism" of the present day is but a rehabilitation of Mesmerism, in so far as it is recommended therapeutically (for male and female hysteria, nocturnal incontinence of urine, onanism, sexual excesses, dipsomania, the abuse of tobacco etc.). Since it has been employed to prevent the interruption of laying in hens, it will, doubtless, ere long prove itself efficacious against sterility in women. It is even recommended in educational matters (De la suggestion et de ses applications à la pédagogie, Paris, 1888, Bérillon).

[In England the vagaries of Mesmer at first excited little attention. James Graham, a physician of Edinburgh, did, indeed, establish in 1780 a gorgeous "Templum Æsculapio Sacrum" or "Temple of Health" in London, and for some time carried on successfully a gigantic system of impostures. But, on the bursting of this bubble, the subject of animal magnetism seems to have been relegated to the limbo of other delusions. In France, however, at the instance of M. Foissac, a new commission to investigate the subject was appointed in 1825, and their report, which gave a qualified endorsement to the claims of the advocates of animal magnetism, was published in 1831. This report was translated into English and published by J. C. Colquhoun in 1833, and, with the "Isis revelata" of the same author, published in 1836, served to arouse the attention of English physicians to the subject. John Ashburner of London studied the subjects of animal magnetism and spiritualism in 1834. Herbert Mayo, the eminent physiologist and surgeon of Middlesex Hospital, wrote an "magnetic sleep" in 1837, and advocated mesmerism with an enthusiasm which cost him his position and finally drove him from London, and John Elliotson (1788-1868), professor of medicine in the London University, was forced from the same cause to resign his position in 1838. The great revival of interest in the subject of animal magnetism was due, however, to the researches of James Braid (1795-1860) of Manchester, whose experiments were published in 1842, and whose work entitled "Neurypnology" etc. appeared in 1843. To him we owe also the word "hypnotism", a condition the phenomena of which were subsequently called by Durand de Gros "Braidism". — Among the more important writers upon this subject in England we may mention: Daniel Noble of Manchester (1845); the eminent savant and arctic explorer Rev. Dr. William Scoresby (1790-1857), whose "Zoistic Magnetism" appeared in 1849; John Forbes (1845); William Gregory (1803-1853), the eminent professor of chemistry in Edinburgh, who translated in 1850 the "Physikalisch-physiologische Untersuchungen über die Dynamide des Magnetismus" (1849) of Baron Reichenbach; John Hughes Bennett (1812-1875), professor of medicine in Edinburgh; Andrew Buchanan; Alexander Wood: and still more recently the eminent physiologist William B. Carpenter (died 1885) and Henry Maudsley.

In the United States the subject has apparently aroused little professional interest, though it has been, of course, exploited by popular lectures and "cranks" of high and low degree. — It is, however, worthy of mention that Robert Wilson Gibbes (1809-1866), professor of chemistry and geology in the University of South Carolina, published a lecture on "The magnetismus of the human body" in 1843. (H.)]

The following theories must be regarded as the direct precursors of the systems and schools of the 19th century. We shall first exhibit briefly the

m. Chemical and Physical Theories.

a. THE PHLOGISTIC THEORY

is merely a theory of animal heat. According to this theory the free heat existing in the inspired air is incorporated with the body by means of respiration, and at the same time Stahl's "phlogiston" is withdrawn from the blood. Heat is also substituted for the "phlogiston". The skin effects the same interchange. — Diseases, according to this theory, originate from the appropriation of too much or too little heat, or from too great or too little excretion of phlogiston. Pure i. e. "dephlogisticated" air was recommended as a remedy.

This view was taught — for chemists already claimed a voice in medicine — by

Joseph Priestley and Adair Crawford (1749–1795). On the other hand, Edward Rigby (1747–1821) transferred phlogistification to the stomach, and held that in digestion free heat originated, which was exhaled by the skin. If this exhalation was disturbed skin eruptions etc. occurred. To this theory was opposed the

β. ANTIPHLOGISTIC THEORY

of Christoph Girtanner (1760–1800), professor in Göttingen, a famous, but not entirely reliable author on syphilis. According to this theory, the newly discovered oxygen — medical systematists never leave anything new unutilized — as the proper "principle of irritability", passed for the "vital force". Disease depends upon the appropriation of too much or too little oxygen. The causes of disease disturb the normal relations of this appropriation. From lack of oxygen appropriated in respiration, and whose action in the body Lavoisier, as we know, had identified with combustion, arise scorbutus (according to Th. Trotter, 1761–1832, of Edinburgh), putrid fever, syphilis, obesity, lethargy etc.: from its excess, consumption (according to Th. Beddoes, 1754–1808, professor of chemistry in Oxford). Hence he recommended breathing foul (!) air (of stables), an idea which still haunts the heads of patients and even of some physicians. (At the present day it is the fashion to send tuberculous patients to mountainous regions, where they die a little more slowly). G. Christian Reich (1769–1848), professor of medicine in Berlin, in 1800 constructed his theory of fever upon "an abnormal, general separation and reunion of the simplest constituents of the body, effected by unnatural, absolute or relative, local or general diminution of the oxygen". A universal remedy for fevers was, therefore, to be found in the acids. On the other hand Jac. Fidelis Ackermann (1765–1815) of Rudesheim, professor in Mayence, Jena and Heidelberg, sought in his later years the fundamental cause of life in the exchange of oxygen, carbon and caloric. Ackermann was a pupil of Sömmering, and in 1804 was called from Jena to Heidelberg. At the outset he was an unprejudiced physician, free from all tendency to theories. In Heidelberg he organized an ambulatory clinic and a policlinic. He improved the instruction in anatomy, and from 1807 forward — he was also teacher of anatomy[1] — he had dissections performed, a thing which had not been customary in Heidelberg before his day. Samuel Latham Mitchill (1764–1831) of New York believed[2] all "infectious, and several other diseases" dependent upon

γ. OXIDIZED NITROGEN GAS

("gaseous oxyd of azote or nitrogene"), in opposition to whom in 1798 (after Ant. François Fourcroy, 1755–1809, had made a more judicious use of chemistry) J. B. T. Baumès (died 1815, "Essai d' un système chimique de la science de l' homme"), professor in Montpellier, in his

δ. GENERALIZED CHYMISMUS,

adopted five classes of diseases: the oxygenated, calorified, hydrogenized, nitrogenized and phosphorized, with the subordinate classes of super-oxygenated (inflammatory and convulsive conditions), super-calorified (hæmorrhages etc.), de-oxygenated (diabetes, rickets, scurvy, chlorosis etc.), de-calorified (diseases which produce weakness and debility) etc., etc. An especial influence upon the medical theory of the natural-philosophical school of the 19th century (as we have already seen in the case of Reil) was obtained by electricity or the newly discovered (1789)

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[1] Tiedemann was called to Heidelberg in 1816 as the first pure professor of anatomy and physiology. It was not until 1847 that a new anatomical institute was erected, after Henle had succeeded Tiedemann as anatomist in 1844.

[2] His views were published in 1795. (H.)

ε. GALVANISM.

It was considered the genuine "vital force": the positive pole was identified with "irritability", the negative with "sensibility", and the theory was carried so far as to declare man the irritating and active pole, woman the sensitive and passive. Galvani himself had located the seat of electricity in the brain, and held that by means of the nerve-tubes (the nerves were at that time believed to be hollow) it reached the whole body and especially the muscles, producing in them contraction analogous to the accidentally discovered twitchings of the frog. Disturbance of the currents occasioned disease. Galvanistic views were embraced by C. H. Pfaff, who first showed the influence of the direction of the current upon the activity of the frog's leg, if electrically excited through the nerve; Alex. von Humboldt (1769–1859), who demonstrated that the animal organs were sources of electricity; J. W. Ritter (1776–1810), professor in Munich, and others. The exaggerated (natural-philosophical) theoretic estimation of the pole etc. was the work of Reil; Christian Leopold Reinhold (1769–1809), Georg Prochaska (1749–1820), who was the first to assert the distinction between the centrifugal or motor, and the centripetal or sensitive, nerve-roots, a fact afterwards established by Sir Charles Bell; Joach. Dietrich Brandis (1762–1846), first physician to the baths in Duisburg, then a professor in Kiel, and finally ordinary physician in Copenhagen; Chr. Ludw. Treviranus (died 1864) in Bonn, and others. C. H. E. Bischoff (1781–1861; father of the anatomist, physiologist and famous embryologist Th. L. W. von Bischoff, 1807–1882, professor in Heidelberg, Giessen and Munich), originally of Berlin, then a mystic, pietistic professor and natural philosopher in Bonn, and C. J. C. Grapengieser (Versuch den Galvanismus zur Heilung einiger Krankheiten anzuwenden, Berlin, 1801; so that Remak revived the use of galvanism, but was not the first to introduce it into practice) wrote on the practical employment of galvanism.

From its brilliant consistency, its ingenious employment of certain vital phenomena and observations, its apparently complete novelty and its ease of practical application,

η. The Brunonian System (1780),

of all the systems which arose in the 18th century, was at all events that which exercised the most prolonged influence upon the 19th.

John Brown (1735–1788), in spirit, character and fate a comrade of his countryman Robert Burns — the son of a poor weaver of Dunse (Lintlaws or Preston), a village of Berwickshire, Scotland, even as a child manifested brilliant endowments. At the age of seven years he already understood Latin, but at ten he began to learn the trade of his step-father. In consequence of his high attainments, however, Brown at the age of thirteen was sent to the Latin school in Dunse, but was compelled again to leave school for a long period in order to earn his daily bread as a reaper. Soon after he received the appointment of an usher in Dunse, and discharged the duties of this position until his 18th year, when he took the post of a private tutor. This position after a short time he exchanged (1755) for that of a tutor in Edinburgh, in order that he might be able to study theology also. Here he fell into such straits theologically and financially, that in 1758 he was forced to return to his original position as assistant teacher in Dunse. But in 1759 he returned once more to Edinburgh. Here he had at one time translated a thesis into Latin for a medical student, and by means of this work was led to the conclusion to become a student of medicine himself. In order to earn money for his maintenance he at first continued his translations, and subsequently composed dissertations, while he also gave instruction in Latin and held medical "quizzes". He was permitted to attend lectures free of all expense. In 1761 he became a fellow of the medical society, but this fact, as well as his continual poverty, did not prevent him from living a rather dissolute life, and indeed from marrying in 1765 to boot. He now opened a boarding and lodging-house for students, but became no more respectable in his habits, and accordingly fell into utter destitution. In this condition he was assisted by Cullen, who had sprung from equal poverty, and to whom Brown made himself useful by his knowledge of Latin, so that Cullen took him as teacher for his children and gave him private instruction with his pupils. A position in the university, which Brown hoped to obtain through his influence, Cullen could not or would not procure for him, and as the result of this, through the fault of both, anger and aversion at once separated teacher and pupil, protégé and benefactor (1770). Brown now advanced in private lectures his theory, to which he had been led by one of his own attacks of gout that disappeared under the use of stimulants, while heretofore they had always become worse under a weakening treatment. These lectures were delivered at first to a few dissolute but talented students (1772). Soon, however, Brown began to laugh at the doctrines of Cullen and others, made loud boasts, divided the students into two camps who did not hesitate to belabor each other with cudgels, and yet lived still more dissolutely, in spite of the fact that he had established a lodge of Freemasons, had twice (1766 and 1780) held the presidency of the medical society, and had received (1779) the degree of M. D. from a university (St. Andrew's). At last he was thrown into prison for debt (1786). His pupils bailed him out. Next Brown removed to London, where fortune at first seemed to smile upon him. He gained reputation and practice and was on the point of receiving a call to Berlin as physician-in-ordinary, and to Padua as a teacher. This, however, was prevented by his enemies, in whose hands Brown himself placed the lever, for he continued his preceding dissolute life, and again fell into prison for debt. Once more his pupils and friends set him at liberty, but he soon after died from the effects of opium, to the inordinate use of which he was a slave, and which he also prized so highly as a stimulant that his drunken expression "Opium, mehercle, non sedat!" was given to him as a motto. Brown left in absolute poverty to the charity of others a widow, four sons (including William Cullen Brown) and four daughters. He was manifestly a man of high mental gifts, but morally deserving of the severest condemnation; one whose poverty did not render him worthy of pity, for he had brought it upon himself and transmitted it to his family. His chief work was entitled "Elementa Medicinæ" (1780).

According to Brown, life is not a natural condition, but an artificial and necessary result of irritations constantly in action. All living beings, therefore, tend constantly towards death. That irritations can compel life is their characteristic. Living beings too are capable of excitability, which is, indeed, inscrutable in its nature, but its seat in the muscles and the medulla of the nerves may be demonstrated. Like its action, i. e. excitement, it is indivisible and undivided. The latter is the cause of the processes which take place in the body, whether sound or diseased, and consequently of life itself.

Irritations are of two kinds, external and internal. To the external belong food, blood, the fluids in general, warmth, air etc.; the functions of thought, feeling, muscular activity etc. are to be considered internal irritations, which have the same action as the external. Moreover irritations are general or local. General irritations arouse excitement in the whole body: the local act first of all upon an individual part, and subsequently upon the whole body.

Health is an intermediate grade of excitement: disease, too high or too low a grade. The two are not conditions substantially different, but simple gradations of one and the same action upon the excitability.

Diseases are divided into general and local. General diseases extend over the whole body, are general from the outset, and arise from an injury of the general excitability. Local diseases are limited to one part, and, at least as a rule, remain thus limited. The latter too are distinguished especially by the fact that they, unlike general diseases, are not preceded by a predisposition ("diathesis", "opportunitas"). By a predisposition is to be understood a condition which deviates, indeed, from health, but yet simulates the latter.

"Local diseases: 1. Organic diseases, limited to a part and not accompanied by a general lesion; e. g. burns, local poisonings, laceration of the nerves, wounds. 2. Organic diseases of the internal or external parts, which have a general lesion for their consequence; e. g. gastritis, cystitis, enteritis, hysteria, abortion, difficult labor, deep wounds. 3. General diseases which have degenerated into topical or local; e. g. suppuration, pustules, anthrax, bubo, gangrene, sphacelus, scrofulous swelling and abcess, scirrhous tumor. 4. Local diseases in which the poison spreads over the body and has no influence upon the excitement. 5. Diseases in which a poison penetrates internally and disorganizes the organs.

Excitement is divided into different grades according to the degree of action of the irritation. The extreme grades of this scale are like the exhaustion and accumulation of irritability as the result of too great or too little power of the irritants, and are death. The intermediate result is ordinarily weakness (asthenia), either direct or indirect. Direct asthenia depends upon the presence of an excess of excitability, accordingly upon too great an accumulation of excitability the result of a deficiency of irritation. It is to be removed by new irritations, which reduce that excess to the normal proportion of health. Indirect asthenia is to be referred to an excess of irritation, by which excitability becomes exhausted. It is to be relieved by opposing a weaker irritation to the too strong causative irritation. The grades of excitability are always in inverse proportion to the excitement. *Most diseases are dependent upon asthenia.* Sthenia is more rarely a cause of disease, and is the result of a less powerful irritation.

Diseases are divided into Sthenic and Asthenic.

"Sthenic diseases are those which are truly inflammatory: a. Pyrexiæ: peripneumonia, phrenitis, small-pox, measles, scarlatina, quinsy, catarrh, erysipelas, rheumatism, synocha: – b. Apyrexiæ: mania, insomnia, obesity etc – (Pyrexiæ are those diseases in which the pulse is irregular.)

Asthenic diseases are the following, viz.: a. Direct asthenic: leanness, restlessness, itch, diabetes, rhachitis, hæmorrhage, diarrhœa, worms, atrophy, scorbutus, hysteria, gout, cough, asthma, colic, spasms, dropsy, epilepsy, paralysis, apoplexy, trismus, tetanus, fever from the mildest up to the plague. b. Indirect asthenic: the plague, malignant small-pox, angina gangrænosa, typhus, hydrothorax, consumption, dysentery" etc.

Brown's diagnosis requires no special symptomatology, but simply a consideration of the antecedent injuries and the earlier condition of the health, without any distinction between local and general diseases. It demands only the determination of the grade of diseases in accordance with the strength or weakness of the acting irritation. For this purpose some pupils[1] of Brown drew up a kind of barometer of disease.

It has been said of the Brunonian system of therapeutics that it sacrificed more human beings than the French Revolution and the wars of Napoleon combined, a statement which would be credible only if nature did not, for the most part, make up for the faults of the physician. Like the system of Asclepiades, with whose views (Methodism) Brown's doctrine, setting aside its change of terms, has the greatest similarity, the Brunonian system held substantially the position that it is not nature which cures diseases, but the physician. The latter must continue to irritate or weaken until the medium height of the barometer of irritation is again reached. Of all the therapeutic methods, that of Brown is the one most deeply sunken in theory, from which even the nearly allied system of Asclepiades was more exempt. It was a fatal principle when applied to practice! For how could one recognize, and by what means could he bring about, the medium height of the barometer of irritation? One should always aim at general effects and not desire those of a local character, and with this object in view he should not limit himself to a single remedy, but rather employ several, that "the excitability may be attacked generally and uniformly". The materies morbi furnishes no indications for the treatment. The physician need not work for its expulsion, but merely allow it time to leave the body. The art of the physician consists in adjusting the right proportion of strengthening or weakening remedies, i. e. their doses. Among the former are to be reckoned opium, ether, aromatics, wine, exercise, meat diet etc.; among the latter, venesection (before all others), emetics, cathartics, fasting, i. e. abstinence from food (elevated to the guiding principle in febrile diseases by Brown especially), rest, cold, sweating etc. All remedies are irritating, and it is only the varying quantity which gives to them different efficacy and effect. For example: "Suppose that the sthenic diathesis has risen to the grade of 60 on the scale of irritation We must then endeavor to remove 20 degrees of the excess of irritation, and for this purpose we must employ remedies whose stimulus is sufficiently weak. Such remedies are then not contra-stimulant, but weakening.

The pure Brunonian system, in comparison with other far less logical and ingenious theories, won immediately after its announcement only a few partisans and opponents, however great was the attention which it aroused on its publication. Perhaps the important occurrences of the period may have been partially responsible for this — an explanation which applies with particular force to France — but the disagreeable characteristics of its founder and the countermining of his enemies (especially the highly esteemed Cullen), contributed their share.

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[1] Particularly Samuel Lynch. (H.)

In sober England, above all, the system found few, indeed no important, followers. The better known of these were Robert Jones (1782), Samuel Lynch and Robertson. Among its opponents were J. F. Latrobe of London, who wrote his dissertation against Brown from Jena in 1795, Trotter, Robert J. Thornton and Beddoes, who has been already mentioned, and even ten years after its publication it was difficult to find supporters of his system in Brown's native land. John Herdman (died 1842) too was an eminent opponent of the Brunonian system.

In America the noble Benj. Rush (1745–1813), a professor in Philadelphia, distinguished himself as a follower of Brown.

Among the Spanish the system of Cullen enjoyed the precedence: still A. Manzona, Miljavila y Fisonel and others were partisans of the Brunonian doctrine.

To France, which at this period was introducing into politics and popular life a much more lasting theory of irritation, and had more important duties to perform than to attend to the novelties of medical systems, and besides was beginning preparations for a new system of her own in medicine, the knowledge of the Brunonian system was brought by Rud. A. Schieferli (died 1837), professor of surgery and midwifery in Berne (according to Reimarus he employed belladonna as a mydriatic), and subsequently by Bertin and Fouquier. The latter translated Brown's "Elementa". On the whole, however, Brown's theory attracted little notice.

In Italy, on the other hand, Brown found numerous and important followers. From among the large number of these we mention: the kindred of J. Peter Frank; his son, the most renowned and important, Joseph[1] (1771–1841), professor in Wilna and Pavia, who in 1803 introduced at Vienna with good success the cold water treatment of typhus: Peter's nephews Franz and Ludwig; then Scarpa and originally Rasori, who subsequently founded a system of his own; Massini, Pietro Moscati (1736–1824) in Milan, Brera, Monteggia. Opponents of the system were, above all, Vacca Berlinghieri and Gaëtano Strambio, Polidori (his pseudonym was Giac. Sacchi) and others of prominence.

In Germany, the far famed land of theories, whither the Brunonian system found its way from Italy, the theory of Brown found a second home, after it had been originally introduced here by Girtanner under his own banner. The latter, however, was unmasked by M. Ad. Weikard (1742–1803), professor in Fulda, then ordinary physician of the famous Catharine II. of Russia, and finally a private savant and the greatest of fanatics in Brunonianism. The so-called "Theory of Irritation", however, a modification of the theory of Brown, of which we shall speak in our account of the 19th century, produced more excitement among the most considerable savants of our native land.

German opponents of Brown were: Stieglitz, Chr. Heinrich Pfaff and others, especially Hahnemann. The original founders of

o. Realism,

which attained an influential development in the 19th century, were of French origin, and both in spirit and time sons of the great Revolution. This theory was first laid out by

Philippe Pinel (1745–1826), of the hamlet St. Paul in the department of the Tarne.

Born and raised in poverty as the son of a village physician, Pinel was originally designed for the Catholic ministry, and it was not until he became thirty years of age that he was able to study medicine in Toulouse and Montpellier. This he did with great success. When he subsequently emigrated to Paris he was at first compelled to support himself by teaching geometry and by preparing translations, until in the year 1792 he received an appointment to the Hôpital Bicêtre and subsequently to the Salpetrière. Doubtless his own distress had warmed his heart to the trials of others and thus facilitated the achievements which he performed in behalf of the suffering. Next he was made professor of hygiene (in the French medical police) and soon after professor of pathology in the École de Médecine at Paris. In 1822 he was dismissed. Pinel was led to the study of mental diseases and their treatment (a department in which his name marks an epoch) by the accidental circumstance that one of his friends, who had become insane, escaped into the forests and was there devoured by wolves. In his efforts to improve the lot of the insane he turned first to the public authorities, who treated him as a "conservative" and "aristocrat", names at that time almost equivalent to the death sentence. Unterrified at this reception, he appeared before the Common Council of Paris and with renewed warmth requested authorization for his reforms. "Citizen", said Couthon to him, "I will visit thee in the Bicêtre to-morrow morning, and woe to thee if thou hast deceived us and concealest enemies of the people among thy madmen." Couthon actually came, the cries and howls of the insane, concerning whom he wished to make inquiries, soon disgusted him, and he said to Pinel: "Ah, citizen, art thou thyself a madman, that thou desirest to turn such cattle loose? I greatly fear thou wilt become thyself a victim of thy preconceived opinions!" Still Pinel began his undertaking the same day, and struck off the chains of a number of his patients. (Griesinger.) Was not this a most wonderful courage of self-sacrificing philanthropy, the glory of which reflects upon our whole profession!

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[1] His monument, erected by himself, stands on Lake Como. It has certainly failed to preserve his remembrance as long as the name of his wife, for whom Haydn wrote the rôle of "Gabriel" in his "Creation".

Pinel became of great importance in the development of general medicine by his principle of substituting exclusively the analytic, or so-called natural-scientific, method for the synthetic method heretofore in vogue. He sought to determine diseases by a diagnosis carefully constructed from the symptoms, a thing which he considered easy. He desired further to classify them in accordance with their pure symptoms, a matter which he regarded as practicable, inasmuch as he considered "disease" a simple, indivisible whole, composed of chief symptoms, following each other with perfect regularity, and varying only in unessential collateral phenomena, and capable of classification like the objects of the natural sciences. Perhaps the artificial classifications of Linné and others may have supplied him with models. Pathological anatomy he subordinated to the symptoms. Pinel, accordingly, regarded even fever as something essential. His classes, in the second place, are arranged according to the tissues. He divides diseases into fevers, inflammations, active congestions, neuroses, diseases of the lymphatics and the skin and undetermined diseases. Inflammations again are divided into those of the mucous membranes, the serous membranes, the muscles, the skin, the cellular tissue and the parenchyma. Fevers, into those of the gastro-intestinal coats, mucous membrane, nervo-glandular and inflammatory fevers, fevers with atony of the muscular fibres and ataxic fever.

The depreciation of the practical aim of medicine, subsequently so very prevalent, Pinel already unduly promoted, since as he said: "True medicine, which consists much less in the prescription of drugs than in the deeper knowledge of diseases, must be again taken up and cultivated like a branch of the natural sciences". "In this way therapeutics loses much, and (clinical) pathology gains nothing" (Daremberg).

Although Pinel was a pupil of Barthez, the vitalistic system was placed by him far in the background. On the other hand

François Xavier Bichat, the rarely gifted and eminent creator of general anatomy (in which rôle we shall learn to know him better hereafter), embraced this system in all its completeness, but sought to found it upon a realistic or analytic basis. He completed the influence of Pinel upon later medicine on the side of pathological anatomy, a branch held in slight esteem by the latter. Indeed he considered the observation of symptoms alone unfruitful, provided a knowledge of their anatomical seat was wanting. The principles of Pinel — scientific cultivation of, and diagnosis from, the symptoms, with the neglect of therapeutics — and those of Bichat — the preponderance of pathological and microscopic anatomy — were subsequently combined into the new medicine of the 19th century, without taking into further consideration the forces of Bichat's doctrine — The tendency to localize diseases was common to both, and it was this tendency too which assisted French medicine in obtaining its controlling leadership in the following age. Bichat denied the applicability of physical laws to the processes of the body.

Bichat calls sensibility and contractility (the latter a term for Haller's irritability) "vital properties". These two are divided, in accordance with the two kinds of life set forth by him — to wit: "organic life, common to animals and plants, and "animal" life, peculiar to animals — into (a) organic or unconscious, and animal or conscious, sensibility, and (b) organic, unconscious (tonicity), and animal, conscious (irritability) contractility. These properties are active for a considerable period only, and this period of their activity we call life. Life is a constant struggle of its powers against death, not (as with Brown) something extorted by force, but a condition of defence. The ultimate limit of the activity of these properties is death. Besides this limited term of activity, the invariability of the laws of inorganic nature is not inherent in them, and consequently they are not amenable to estimation, like the latter. Hence the bodily processes cannot be considered from the same point of view as chemical and physical processes, since they are separated by the wide chasm which lies between constancy and inconstancy. To each tissue, as we shall subsequently learn them, Bichat too assigns a special kind of sensibility and contractility. In the glands e. g., and the serous and cutaneous surfaces, both of these are unconscious. The cellular tissue possesses no animal, but organic sensibility, and sensible and insensible contractility. The nervous system possesses animal sensibility, but no animal and organic contractility. The arterial vascular system has no animal, sensible contractility, rarely very marked insensible, organic contractility and sensibility. The venous system has no animal sensibility and contractility etc. Each of these tissues draws from the blood the materials related to its special powers.

Though Bichat embraced chiefly the pathological views of Solidism, still he was not partial, but allowed to the blood or the fluids a certain rôle, and even vitality.

"Almost all the phenomena of disease point to the solids, but the causes may lie in the fluids as well as the solids. An example will make this manifest: the heart may contract abnormally 1., because the organic sensibility is elevated, while the blood remains normal: 2., because the blood is increased, as in plethora, or altered, as in putrid fever etc., while the organic sensibility is unchanged. Should the excitation be doubled, or the organ be twice as susceptible as usual, the effect is always the same: there is an acceleration of the pulse. It is always the solids which play the primary rôle in disease. It is impossible to say what 'vitality of the fluids' is, but nevertheless it exists, and the chemist who analyses the fluids has only their corpse, as the anatomist has only the cadaver of the solids."

Diseases he declared to be alterations of the vital properties. The "vital properties" of each individual tissue, however, differ from those of every other tissue. Hence the morbid alteration of each individual tissue must differ from that of all others, so that in every living organism composed of different tissues, one of these tissues may be diseased while the rest continue sound.

The task of therapeutics is to restore to its normal condition the proper vitality of the parts. Bichat's last project was to submit the materia medica, the weapons of the physician, to an extended and thorough proof.

The foregoing consideration of the greater and lesser systems, the theories and schools of the 18th century, certainly awakens at first a feeling of respect for the men (most of them possessed of intellectual importance), who desired to win for medicine, as had been done for the other sciences, the benefit of an adaptation and mastery of the immense material and the ever-changing phenomena of healthy, and especially of diseased, life, by means of one or more principles utilized in the formation of a system. On the other hand, there arises too at once a feeling of disappointment, that such great intellectual power and intellectual labor should have been employed, if not fruitlessly, at least without any corresponding and permanent benefit to science, and above all to life; that, indeed, these should have been sacrificed in that strife, which in medicine seems unable to lead to any equivalent result. For medicine, as the science of both healthy and morbid life, like life itself, cannot be compressed into a system. Its very essence, like that of life, is development. Hence neither is adapted to any rigid system of reasoning which aims at absolutism. This fact is very strikingly shown in the history of the theories of the 18th century.

Two other lessons, however, are furnished us by the systematizing struggles of the physicians of the last century. The first is this: that, as we emphasized at the outset, in almost all "new" systems old principles exclusively, or at least chiefly, reappear. The second is that in the hurry and work of the day, history, and particularly medical history, is never, or at least never deliberately, consulted, in order to guard against the repetition of by-gone theories and fruitless efforts — a fact which we observe even at the present day. And yet history is the sublimest of all experimental sciences, to which in medicine certainly the view should be always and everywhere directed. But "physicians seem to be condemned to the fate of rarely discovering the golden *via media* of truth between the by-paths of error." (Hecker Sr.)

3. PHYSICIANS EMINENT AS PRACTITIONERS, CULTIVATORS OF PRACTICAL SUBJECTS, MEDICAL GEOGRAPHERS AND HISTORIANS.

Besides the long list of Systematists already mentioned, and their still more numerous followers, there towers up a number of physicians who shunned the ostentation of creating systems and did not yield allegiance, or at least yielded no unconditional allegiance, to any of the existing systems, though they enriched science and advanced practical medicine in a greater or less degree. Among these belong, above all, quite a number of important practising physicians, who in general occupied during the 18th century a much higher and more respectable (because a more independently scientific) position than is the case, on the whole, in our own age, where university influences predominate. That fame which some of these men were compelled to do without among their systematizing contemporaries, posterity has given them in abundance. This fate befell, above all (and in a way not even remotely anticipated by himself), that modest Viennese practitioner and great inventor — not accidental discoverer — of thoracic percussion, "the true compass of medicine",

Leopold Auenbrugger, a nobleman of Auenbrugg. We place him at the head, because to him is due a great part of the advancement of modern diagnosis. In Auenbrugger too was approved that law of historical culture, that it is not the most learned, but ever the most gifted alone, who enrich science through new discoveries which impress their stamp upon the future.

Of Auenbrugger's life our knowledge is only fragmentary. He was the offspring of the union of the well-to-do inn-keeper Sebastian Auenbrugger and Maria Theresa, née Kaschutnik, both of Graz in Steyermark. He was born Nov. 19, 1722. He had several sisters, of whom nothing further is known. He lost his father, a respectable and charitable man, in the year 1743. Auenbrugger studied the humanities and philosophy in his native city. His special professional studies he pursued in Vienna, where, after their completion, he occupied himself for several years as a simple practising physician. In the year 1751 he received the charge of the Spanish military hospital and the hospital of the Holy Trinity, without at first, however, obtaining any salary for his labor. He accepted the position only to be able to apply himself to his independent studies better than was possible in private practice. His marriage with the beautiful Marianne von Priestersberg, twenty-four years of age, took place Nov. 18, 1754. From this union descended two daughters, one of whom died early, while the other married a baron of Zois-Edelstein, of whose two daughters one again died in early life. Some descendants of Auenbrugger's granddaughter are still living. Auenbrugger himself died of senile asthenia May 9, 1809, aged 87 years.

His invention, so pregnant with results (Inventum novum etc., 1761) and which he tested for seven years before its announcement, was made during the period of his activity in the Spanish hospital. During his lifetime, at least during that portion of it in which he was capable of active work, it remained unnoticed, misunderstood and even designedly opposed, and of course de Haën was at the head of this opposition. The only notable exceptions to this statement were Stoll and his pupil Eyerell. Nothing good is done in a hurry, and whatever is quickly recognized and at once adopted with enthusiasm, is, as a rule, of but short duration — such are the teachings of the history of medicine. But had not Corvisart in 1808 translated his treatise into French — Rossière de la Chassagne had done the same as early as 1770 — and above all had he not maintained Auenbrugger's right of possession, and elevated his invention by the prestige of his own name and position, the name of the German would probably be known only as that of a man who ventured to have a fruitful idea in advance of a famous Frenchman. We quote, therefore, to Corvisart's honor, his expression on this point: "I know very well how little reputation is allotted to translators and commentators, and I might easily have elevated myself to the rank of an author, if I had elaborated anew the doctrine of Auenbrugger and published an independent work on percussion. In this way, however, I should have sacrificed the name of Auenbrugger to my own vanity, a thing which I am unwilling to do. It is he, and the beautiful invention which of right belongs to him, that I desire to recall to life. Such unreserved acknowledgement on the part of an eminent French physician cannot be sufficiently contrasted with the disparagement, the envy, the misconception and the stupidity of the German medical specialists of that day and their following! Auenbrugger too foresaw it all: "I have very well foreseen that I shall meet with great opposition as soon as I have published my invention, for envy, malevolence, hatred, jealous disparagement and even slander have never been wanting to men who have either glorified or perfected the sciences and arts by their discoveries."

As regards the character of Auenbrugger, all accounts agree that he was an indefatigable worker, always kindly disposed and charitable, so that many a poor student owed to him his success. He was a great friend of music and the arts in general, and had himself written an opera "Die Rauchfangkehrer" (The Chimney-sweeps). The following is an eminently characteristic trait. When Auenbrugger in 1768 resigned his duties in the Spanish hospital, he was offered his choice between an annual pension of 400 marks ($100) and elevation to the nobility. He chose the former. Subsequently, indeed, he received, at his own request, a patent of nobility from the emperor Joseph II. But we may conjecture rather that his wife and daughter were the occasion of this request, than assume that he himself was foolish enough to have the slightest desire for nobility. For he had already attained the truest nobility by his discovery.

Posterity too has created for him a monument, not of glittering metal, but one in his own opinion much more valuable. In his home, years ago — under the lead of Franz Clar, professor of general pathology and pharmacology in Graz, a man deserving of fame for this action — an "Auenbrugger Stiftung" was founded, from the interest of which needy students of medicine and physicians are supported, and Piorry, the inventor of the pleximeter, has to-day no occasion to remark that had Auenbrugger been a Frenchman a monument would have been erected long ago to his memory. The debt of the whole German people has been discharged by the German Austrians!

While the surgical diagnosis of the Ancients employed (as we have seen with Paul of Ægina and others) sounds, specula etc., their internal diagnosis was limited almost exclusively to the simple employment of the unarmed senses. The latter, even as early as the Hippocratists, were specially cultivated for this very purpose, particularly the senses of sight and feeling. Whether magnifying glasses too were employed by them for diagnostic purposes is uncertain. Santoro was the first to use the balance, an enumerator of the pulse, and a sort of thermometer and hygrometer; Boerhaave employed the thermometer in the axilla and made use of the simple lens; John Floyer, and after him Haller, utilized even the watch marking seconds. The ear had been early employed in auscultation and in the percussion of tympanites and ascites. Indeed the Salernian physicians, basing their action upon the Ancients, had thus utilized the hearing. But a diagnosis of diseases of the great viscera had never been attempted in this way, until finally Auenbrugger independently brought to light an ingenious use of the ear, which opened the way for, and gave the impulse to, a clearness in the recognition, especially of diseases of the chest and abdomen, heretofore unattained and unattainable. This method was tapping against the chest, percussion. He made the simple observation that "the chest of the healthy man resounds when it is percussed", tested his idea for seven years, and then wrote in 1761 his "Inventum novum ex percussione thoracis humani ut signo abstrusos interni pectoris morbos detegendi", in which, among other things, he says with great simplicity:

"I lay before you, benevolent reader, a new sign for the elucidation of the diseases of the chest, discovered by me. This consists in the percussion of the human thorax, by the varying resonance of whose tones (ex cujus sonituum resonantia varia) a judgment may be formed as to the internal condition of this part. . . . I have written what I have again and again proved by the testimony of the senses with much labor and fatigue; nor have I ever given place therein to seducing self-love."

Like a great, and consequently a humane, physician, he concludes his work as follows:

"May what I have written conduce to the comfort of the unfortunate sick, and to the advantage of the true cultivators of medical art. Such is my desire!"

His invention was thus designed above all to *benefit the sick*, not to become merely a subject of study in itself, a degradation which a later age, involved in French precision (so-called), objectivity, and therapeutic helplessness, and forgetful of the design of all diagnosis and of all medical knowledge and investigation — the cure and alleviation of disease — stamped upon it.

Other writings of Auenbrugger were: "Ueber die stille Wuth oder den Trieb zum Selbstmord, als einer wirklichen Krankheit" Dessau, 1773; "Experimentum nascens de remedio specifico in mania virorum. Viennæ, 1776."

During the last century Auenbrugger's invention attained but sparing recognition Even in 1803 Sprengel wrote "It is scarcely credible that he — Auenbrugger — could have diagnosticated any diseases of the lungs and thorax by means of the resonance."

· Besides the physicians already mentioned and the ingenious Unzer,

JOHANN ERNST WICHMANN (1740–1802) of Hanover, author of "Ideen zur Diagnostik" and creator of the scientific department of diagnosis, must be classed among those who bestowed some attention upon the new acquisition, although he did not recognize its significance. Wichmann was the first (in 1786) to designate the itch-mite, or rather its transfer from man to man, as the cause of the contagiousness of the itch, a fact which he demonstrated upon himself, after Bonomo, a hundred years before, had called attention to it as a fact observed by the common-people.

Wichmann's father was a Wundarzt, and he was himself destined for this calling; in fact he had already flourished the barber's bowl when he entered the gymnasium. He went to Gottingen in 1759 and graduated in 1762. After remaining for a long time in Paris he became disgusted with French medicine and went to London, where the eminent physician John Pringle (1707–1782) was his teacher. In 1764 Wichmann returned to Hanover, but it was a considerable time before he and Werlhof succeeded in practice. At an early age too he became somewhat deaf. After he had been court-physician for 23 years without pay, on the death of Zimmermann he was appointed second physician-in-ordinary. Wichmann was highly esteemed as a physician and writer, and, like the Hanoverian ordinary physicians to be mentioned hereafter, he was famous as a great practitioner.

The following extracts from the already mentioned work of Rohlfs on the medical classical writers of Germany may serve to exhibit Wichmann's method of observation and thought. They are partially applicable too to the present day, and show the judgment of the past upon our "modern" methods. "There are fashions in medicine, to which every physician must be a slave, unless he is willing to be considered old-fashioned, or to be laughed at by his colleagues. The only trouble is that these fashions of physicians, like other fashions, are changeable, though they seem to be profitable, for they come into vogue. . . . Eighteen years ago it was the fashion in all Europe, as it is again to-day, to employ electricity upon paralyzed patients, but the fashion lasted only nine years. Medical fashions in general have also this similarity to others, that they usually recur every nine or ten years." — "It is not simply the exanthematous diseases that are contagious. There are many which infect more slowly through association in rooms and beds, as gout, diarrhœa, whooping-cough, intermittent fever, through the breath or sweat in beds. This cannot surprise us. Even the expired air of a man acts as a poison. In this way consumption is communicated. We observe it most commonly in married persons. From Galen to Maret" (father of the subsequent Duke of Bassano) "in 1779, consumption has always been considered infectious. Morton even maintained infection from coitus. Undoubtedly a susceptibility is always associated with it." — Wichmann engaged in testing the cutaneous sensibility by means of pieces of gold or other metals, a procedure subsequently styled "metalloscopy", particularly by the French physician Dr. V. Burq (1823-1884), who rediscovered the method towards the close of the forties and built upon it a system of "metallotherapy".[1]

Before Wichmann, and for a long period contemporary with him, there also lived in Hanover the eminent observer, far-famed practitioner and poet — "one of the most distinguished physicians of his time" (Sprengel)—

PAUL GOTTLIEB WERLHOF (1699–1767) of Helmstädt, where he had studied. At the age of twenty years he settled in Peine, near his birth place, to test by practice what he had learned. After five years, however, he went to

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[1] "Métallothérapie, nouveau traitement par les applications métalliques", Paris, 1853.

Hanover, where the two physicians Hugo and Plohr assisted him, like genuine colleagues; for at that time to be a colleague was not to be an enemy. In this way he speedily attained practice, and declined a professorship in his native city because a practical career was more valuable to him. Accordingly he was appointed court-physician. He had already distinguished himself as a writer. Though he was a German poet, he wrote all his scientific works in Latin because this tongue alone was respected by savants. He knew how to handle the Latin in a masterly manner, and was also a complete master of English, French and Swedish. This knowledge of modern languages was decidedly exceptional among the savants of that day. In 1743, after making the campaign which was decided by the victory near Dettingen on the Main (June 27), Werlhof was appointed physician-in-ordinary to George II. In this position he attained world-wide fame as a practitioner and writer, and was indefatigable in his exertions to elevate science. His relations with Haller were active and friendly. In his old age he was long tormented by the gout, and he died finally of apoplexy.

Werlhof's fame has been preserved to us until recently by the name of the morbus maculosus Werlhofii, which he first described. He merits high honor for his early struggle to establish in Germany the use of the cinchona, and in the last century he was esteemed an historian and a practical writer of the first rank.

The most widely known among the Hanoverian physicians, particularly by his works: "Ueber die Erfahrung in der Arzneikunst"; "Ueber die Einsamkeit"; "Ueber den Nationalstolz" etc., was undoubtedly

JOH. GEORG ZIMMERMANN (1728–1795), of Brugg in the canton of Berne.

The son of a German-Swiss senator and a French-Swiss mother, both of whom belonged to this well-known, dual-tongued canton, Zimmermann himself like almost all the German inhabitants of this canton to-day, spoke and wrote as good German as French. At the age of fourteen he came to Berne, and, after acquiring the requisite preliminary education, attended the university of Göttingen, where his great countryman Haller was teaching. The latter, in accordance with a good old Swiss custom, assisted his young countryman in every possible way, and under his direction Zimmermann, at the expiration of four years, wrote his dissertation "De irritabilitate". Six months later he visited Holland and Paris, and in 1752 came to Berne, whence he removed as Physicus to his native city. Here he formed a lifelong friendship with Tissot. His widely famous works also originated during his residence in Brugg. As the result of his writings Zimmermann became a fellow of many learned societies, received a call to become ordinary physician to the famous premier of Mayence, Count Stadion, and afterwards to Poland and Soleure. At the latter place, however, some doubt was entertained whether Zimmermann, being a Protestant, would hold his patients to timely confession and the communion of the actual body of Christ, and his removal here was accordingly broken off. Instead he went in the year 1768 to Hanover as ordinary physician and the successor of Werlhof. In this position, which he had always desired, Zimmermann likewise did not find entire satisfaction. He suffered continually from Swiss homesickness, and was also visited by severe bodily suffering. An operation for hernia, undertaken in 1770, and in which the opposition of Schmucker and Theden is said to have proved serious in its results to Zimmermann, did not help him in these troubles. In 1782 he married for the second time. Misfortune and disease, however (combined perhaps with hereditary tendencies), at last brought his misanthropy to an open outbreak. In character Zimmermann was fickle and stubborn, and, like an American,[1] vain of the highest acquaintanceship. "What say you, my dear friend, to this correspondence with a lady (Catharine II.), who just now orders 250,000 men to march against the Turks?" "As knight of the third class I am associated with princes, admirals, generals etc."

Zimmermann was a man of ingenious endowments, and a physician who, like Boerhaave and Werlhof, enjoyed a world-wide reputation. In medical science he merits our special regard from the fact that he endeavored to free it among the public from the reputation of a secret art, a reputation which it still retains among the laity.

Another among the Hanoverian physicians-in-ordinary,

L. F. BENJAMIN LENTIN (1736–1804),

had distinguished himself, before his installation in office and during his earlier residence at Klausthal, as a writer on practical subjects and as an observer. (His son Jac. Fried. Ludwig, 1776–1803, was also a physician). The following physicians are also worthy of notice:

BALTH. LUDWIG TRALLES (1708–1797) of Breslau,

to whom Hensler addressed his famous letters on inoculation, and who was indiscreet enough to write, like a blockhead, in opposition to Lessing;

JOSEPH VON QUARIN (1734–1814),

son of Peter Quarin (until 1794 professor of medicine in Vienna) and ordinary physician of Joseph II., and (a matter of course in Austria) likewise a count. Graduating at Freiburg in Breisgau as early as his 18th year, he came to Vienna and, on the completion of the general hospital, was made its physician-in-chief. Even in the choice of his physicians Joseph II. had no success. — Quarin wrote "Animadversiones practicæ in diversos morbos"; "Commentatio de curandis febribus et inflammationibus" etc.

Other physicians eminent for their practical and scientific ability were:

Rud. Augustin Vogel (1724–1774); Karl Strack (1726–1806), who distinguished himself by his observations; Sam. Gottl. Vogel (1750–1837), originally in Göttingen, then ordinary physician of Mecklenburg, and author of a famous text-book on diagnosis; the elder Joh. Chr. Stark (1753–1811) of Jena, distinguished for his "Dissertatio de tetano"; Marcus Herz (1747–1803), a famous physician of Berlin ("Briefe an Aerzte", "Versuch über den Schwindel" etc.), who was himself a friend of Kant, and his wife Henriette — a characteristic of the time — the "bosom friend" of Schleiermacher; Christian Gottlieb Selle (1748–1800) of Berlin, ordinary physician and president of the medico-chirurgical college; Joh. Ludwig Formey (1766–1823), likewise a famous practitioner in Berlin. Chr. G. Gruner must also be mentioned here as the author of an excellent treatise on semeiology, and

KARL AUG. WILHELM BERENDS (1759–1826) of Anklam,

professor in Frankfort-on-the-Oder, Breslau and Berlin ("Vorlesungen über praktische Arzneiwissenschaft", 1827, published by Karl Sunderlin). — Equally great as a man, a teacher and a physician, and still more eminent, if possible, for his steady observance of the objects of practice, was the ingenious pioneer

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[1] How comforting to find American "toadyism" shared by even a "fickle and stubborn" Swiss! (H.)

Joh. Peter Frank (1745–1821),
the founder of medical police as a distinct department of science, and a man sprung from poverty, want, and the varied limitations of rustic simplicity. His ideas and aims are exhibited in the following characteristic passage more fairly than could be done by most teachers: "This I quietly remarked, and it conduced to my great happiness to be able to convince myself, that my pupils did not swear by the words of their teacher, but dubiously and with an anxious desire for knowledge, betook themselves to the sick-bed as to a trusty touch-stone. Proved by this, not only I myself, but also these pupils of mine, have for many years recognized much of that which had been esteemed as genuine gold to be base metal and of bad standard. Thus doubt upon doubt grew up among my hearers, and when they had gradually and imperceptibly abandoned the profitless swarm of hypotheses, a short time before so highly prized, then first they became that which I wished them to be, *friends of the truth, not of learned ostentation, unwearied and eager for each new ray of light, whatever its source.* Hence too it was rare for my pupils to abandon my views." The character of a truth-loving practitioner is shown in his remark that in his younger years his patients dreaded *him*, but that now, in his old age, he himself dreaded his patients.

Born in the little hamlet of Rodalben, in the present Bavarian Palatinate, Frank, at the age of nine months, was literally cast before the door of a merchant by his cruel father who was irritated by his cries, and at the age of four years was almost smothered by a crowd of boys falling upon him. When nine years old, the pupil of a Piarist school at Rastadt, he was to have been sent to Italy and there castrated because he had a fine voice. From this fate he luckily escaped, and subsequently studied at Pont à Mousson near Metz, in Heidelberg and Strassburg. At the age of 24 Frank was made court and garrison physician in Rastadt, three years later ordinary physician at Bruchsal, and in 1784 a professor in Göttingen. In the following year, however, he went thence to a similar position at Pavia, and in 1786 was made Protophysicus and general director of sanitary affairs in Lombardy. In 1795 he came in a similar capacity to Vienna to direct army medical affairs, was made an aulic counsellor and director of hospitals. Here too, in conjunction with his prosector, Aloys Rud. Vetter (born 1765), subsequently professor of anatomy and physiology in Krakau, he founded a museum of pathological anatomy. In 1804 Frank, disgusted with bureaucratic chicanery, removed to Wilna as clinical professor, then went to St. Petersburg as ordinary physician and counsellor of state, but in 1808 allowed himself to be pensioned in order to devote himself to his muse in the glorious and unrivalled Freiburg in Brisgau. But in Freiburg too he was not permitted to remain long. In 1811 he returned to Vienna, and died there a practitioner as he had begun. — His pupils were enthusiastically devoted to him, and the famous surgeon Walther, his younger countryman, said of him: "No one made so elevating and permanent an impression upon me as J. P. Frank. His teachings fell upon susceptible minds like the moistening dew. It was not simply the mass of learning which we acquired but the stimulus to independent investigation and the inner unfolding of the mind, bursting as it were its fetters, which we owe to him." He founded in his home an institution for the care and education of poor children. — His chief works were his "Epitome de curandis morbis" (often printed in spite of its six volumes, and translated into French by Gaudereau) and his ingenious system of medical police ("System einer vollständigen medicinischen Polizey"), of which we shall speak hereafter.

It is related of Frank that, in accordance with his mental characteristics, he did not forget his humor even beside the bed of death. On one occasion eight physicians were sitting upon the bed of a dying patient, when Frank remarked: "This reminds me of the grenadier of Wagram, who, when hit by eight balls, cried out 'Sapperment! It takes eight bullets to kill a French grenadier!" On another occasion when greater economy in the management of his hospital patients had been prescribed to him, he wrote back: "Economy of men is always the chief of all varieties of political economy", and "Mothers in lying-in hospitals cannot be fed on water, Epsom salts and arcanum duplicatum."— Frank's style, strong, original and warm as it always is, often offends against the rules of accuracy and clearness through his efforts to unite sudden inspirations of thought with brevity of expression.—On the whole Frank must be looked upon as one of the most pronounced and important prodigies of modern medical history.

CHRISTIAN EBERHARD KAPP (1739–1824)

is usefully distinguished as the author of a collection of select treatises, which he translated for the use of practical physicians. The Frankfort physician

JOHANN CHRISTIAN SENCKENBERG (1707–1772, killed by a fall from the tower of his own institution), deserves a place here not because of his own great services to science, but by reason of his agency in the scientific education of others and his services to humanity.

For the well-known "Senckenberg'sche Stiftung" to-day serves both purposes, and is likewise the only example of such noble charity on the part of a physician in Germany. It is worthy of comparison with the Radcliffe Library of Oxford (founded 1737), established by the English physician-in-ordinary John Radcliffe (1650–1714). Yet by his practical precepts and his freedom from prejudice Senckenberg stands above the ordinary mass of physicians, though both of the qualities mentioned are flavored somewhat strongly with Pietism.

"Abstinence and moderation" thought he "are a certain means of securing corporeal and mental health. Nature possesses within herself the opportune means of guarding, maintaining and restoring the health." This he said in opposition to the medical fashion of prescribing riding for hygienic purposes, and he thought the fashionable "Recipe caballum" of physicians quite superfluous Doubtless too he had made extensive study of the history of medicine to enable him to criticise the fashion justly. He was also opposed to the bare study of books, and thought "The patient is the best book. Simple knowledge inflates, and incapacitates one for distinguishing the right course. He cures with greater certainty who is filled with love from God, who beholds nature with a simple heart and eye, and from her draws his wisdom."—An active and versatile writer on practical subjects was the Swedish physician-in-ordinary

NILS ROSÉN VON ROSENSTEIN (1706–1773),

also a professor in Stockholm. Following in the footsteps of Lars Roberg (1664–1742), he naturalized in Sweden clinical instruction in medicine, and his "Diseases of children" maintained its popularity for a long period. The Dane

FR. LUDWIG BANG (1747–1820) of Copenhagen was eminent for his hospital observations.

England, the peculiar education of whose physicians rendered her a congenial home for men of this character, was distinguished by a number of eminent observers, and independent, capable and successful practitioners. We have already mentioned Mead and Cheyne, the former of whom, like most of those who follow, was eminent as a man and worthy of the highest respect. The works of these English physicians were speedily disseminated throughout Germany by means of translations.[1]

The chemical physician John Huxham (1694–1768) of Plymouth, an eminent observer, advanced our knowledge of putrid dissolution of the blood — a condition first asserted by him — and of epidemic diseases. His "Essay on fevers" etc. (London, 1739) survived six editions. Francis Home [professor of materia medica in the university of Edinburgh] performed a similar service for croup [in his "Inquiry into the nature, causes and cure of croup", Edinburgh, 1765.] Superior to Huxham in importance, and next to him in point of time, stood

SIR JOHN PRINGLE (1707–1782),

a popular practitioner and ordinary physician in London, who maintained intimate relations with several German physicians and lived for a long period in Göttingen, in order to rid himself of his doubts with respect to the interpretation of the Bible. He was also a pupil of Boerhaave. As the chief of the English army medical department (from 1742–1758) he rendered himself extremely useful, and likewise became very famous in the rôle of an author on military medicine by his work "Observations on the diseases of the army in camp and garrison", Lond. 1752. Pringle did much for the improvement of hospitals by the introduction of ventilation into the wards for the wounded etc., [and it is said that we owe to him the recognition of the neutrality of army hospitals.] The different forms of dysentery he proved to be varieties of one and the same disease.

As Pringle distinguished himself in military hygiene, so

JOHN HOWARD (1726–1790) of London

rendered eminent service in the improvement of English prison arrangements, and must be regarded as their medical reformer. And such a reform was needed; for "the prisons were a breeding-place of vice and brutality. Old castles and customs-prisons, with damp, cold dungeons or confined cells were used. Beneath the narrow, iron-barred windows were placed boxes, into which the charitable public cast their alms for the support of the incarcerated; for if the friends and relatives of the convicts did not take care of them, hunger was added to their other miseries. In these over-crowded holes diseases were rife, riot fermented and the worst vices prevailed. It was a hell upon earth. Three hundred offences and crimes were punished by hanging, e. g. stealing a fowl." (Elizabeth Fry.) Howard travelled extensively in order to study the arrangement of prisons, and died at Cherson in the Crimea, whither he had gone to observe the plague in its very home. [His works were entitled "State of the Prisons in England and Wales" etc., London, 1777, and "An Account of the Principal Lazarettos of Europe", London, 1789.]

WILLIAM HEBERDEN (1710–1801)

was an extremely popular London physician, and the first to describe varicella and angina pectoris (asthma Heberdenii, 1766). His chief work was entitled "Commen tarii de Morborum Historia et Curatione", [London, 1802, published posthumously by his son, and distinguished for the almost classic style of its Latinity. It was chiefly upon Heberden's suggestion that the "Medical Transactions of the Royal College of Physicians first appeared in 1768.]

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[1] These translations have been characterized as emanations of an "Anglomania". The view that they became naturalized in such numbers as a natural counterpoise to the German rage for systems during the 18th century seems, however, better warranted.

George Armstrong (died 1781) of London,

who in 1769 opened the first children's hospital in Europe, was the pioneer of the improvement in the management of children's diseases. [His "Essay on the Diseases most fatal to Infants" appeared at London in 1768. George Armstrong is not to be confounded with his brother John, who was likewise a physician, but is better known as a poet.]

John Fothergill (1712–1780) of London,

acquired a justly famous name by his observations on angina gangrænosa, and particularly upon neuralgias (malum Fothergillii), hydrocephalus, and nervous diseases in general. He was one of the most fortunate of physicians and one of the greatest benefactors of the poor (he was a Quaker), and the latter class, so far as concerns the attainment of a good practice, he looked upon "as bridges to the pockets of the rich", though a part of what he gained from the latter he returned to their less fortunate fellows. He is said to have given away to the poor during his lifetime £200,000 sterling. [Fothergill founded at Upton in Essex in 1762 a garden for the cultivation of exotic and especially of medical plants.]

William Fordyce (1724–1792)

wrote on gangrænous angina and the venereal disease etc., while [his nephew]

George Fordyce (1736–1802) of London,

educated in Leyden, distinguished himself as a practitioner and chemist. He made investigations on the temperature of animals, described intermittent and continued fevers, and wrote "Elements of the Practice of Physic", London, 1768.

[To whom we may add:

John Radcliffe (1650–1714),

an eminent, witty and successful physician in London, author of the wise remark that "When a young practitioner he possessed twenty remedies for every disease, and at the close of his career he found twenty diseases for which he had not one remedy:" his protegé, the "noble"

Richard Mead (1673–1754),

whose success as a physician was warranted at least by his character as a man. Mead was a prolific author, but his "Monita et præcepta medica" (London, 1751), which survived numerous editions, is perhaps his best known work. Mead was also the author of the first quarantine regulations adopted in England.

Sir Richard Blackmore (died 1729),

who, in spite of Sydenham's contemptuous advice and his mediocrity as a poet, became an eminent and successful physician in London and wrote on inoculation, phthisis, hysteria, gout, rheumatism etc.

Sir Hans Sloane (1660–1753),

President of the Royal Society (1727), whose extensive museum and library formed the nucleus of the present British Museum:

Sir George Baker (1722–1809),

physician-in-ordinary to George III. and nine times president of the College of Physicians, who wrote on the Devonshire colic, dysentery and inoculation: and the genial, benevolent Quaker,

JOHN COAKLEY LETTSOM (1744–1815),
the busiest, most philanthropic and most successful[1] physician of his day, as well as a ready writer.

THOMAS DOVER (died 1741)
deserves mention as the inventor of our popular "Dover's powder", and by his discovery of the famous Alexander Selkirk, whom he brought back to England, gave occasion to the composition of Daniel Defoe's (1661–1731) well-known romance "The adventures of Robinson Crusoe", which appeared in 1719. Robert James (1703–1776), a physician of London, was the inventor of the famous febrifuge "James's powder", by the sale of which as a nostrum he acquired a large fortune. He likewise wrote on hydrophobia, a "Modern practice of physic" (1746), and "A short treatise of the disorders of children" (London, 1780). (H.)]

In France, when compared with the countries just mentioned, medicine was languishing during the first three quarters of the 18th century, and did not begin to flourish until after the founding of the "Société Royale de Médecine".

In the "Mémoires" of this society an interest was taken by the following physicians: Lepecq de la Cloture (1736–1804) of Rouen; Caze (epidemic diseases); Paulet (epizootica); L. Jean-Marie Daubenton (1716–1799); J. B. Fr. Carrère (1740–1802); Chabert; Saillant; Chabrol; R. P. Colle; Lieutaud; Jean Noel Hallé (1754–1822), physician to Napoleon I., who rendered service in the introduction of vaccination, and is known for his courageous petition for the liberation of Lavoisier, who was not permitted to live even long enough to complete an analysis which he had already begun; Thouret, who introduced Jennerian vaccination; Abbé le Noble; J. J. le Roux (1749–1832); Vicq d' Azyr (1748–1794), the ordinary physician of Marie Antoinette, and others.

Among the French-Swiss physicians

SAMUEL AUG. ANDR. DAV. TISSOT (1728–1797) was eminent for his services.

He came from Grancy in the canton Vaud, was a physician in Lausanne, for a short time a professor in Pavia, a friend of Zimmermann and Haller, and one of the most popular physicians of the 18th century. He rendered himself prominent by his writings on nervous diseases, epilepsy etc., and particularly as a popular author.

The Italians possessed in

FRANCESCO TORTI (1658–1741),
professor in Modena and physician-in-ordinary, a distinguished promoter of practical medicine and pharmacology, inasmuch as he introduced the cinchona into Italy, and in

GIOV. BATT. BORSIERI DE KANILFELD (1725–1785),
professor in Pavia, an eminent clinician, who studied particularly the symptoms and course of disease in the manner of the mother-school of Vienna. He was the author of a famous work on special pathology.

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[1] Lettsom's practice sometimes brought him in £12,000 a year, yet a large part of his practice was gratuitous, and he gave away immense sums in charitable contributions. He is said to have been the author of the well-known quatrain:

"When patients sick to me apply
I physics, bleeds and sweats 'em.
Sometimes they live, sometimes they die:
What's that to me? I. Lettsom." (H.)

Michele Sarcone of Naples obtained considerable reputation by his history of Neapolitan diseases, while

Piquer (1711–1772) the Spaniard, who translated Hippocrates into Spanish, distinguished himself as a laborer on practical subjects, particularly the doctrine of fevers. He, however, denied the circulation of the blood, a subject upon which most Spanish physicians of that day were entirely ignorant. Gaspar Casal was the first describer of the Rose or Pellagra in Spain.

Other Spanish physicians of reputation were:

Ant. Franseri; José Ignacio de Torres, a syphilographer; Ignacio Luzuriaga, (colic of Madrid); Masdeval (putrid fever); Alcinet; Ant. Capdevilla, a very learned physician who was associated with Haller; Lafuente, Salva and Arejuala (yellow fever); besides the two last mentioned, Amar and Gil were disseminators of inoculation. The Spaniards, almost all of whom were yet devoted to the ancient medicine, discussed the doctrine of bleeding in the 18th century with corresponding activity, and this doctrine was the basis of the comic reputation of Sangrado in Gil Blas. Corral distinguished himself as a champion of frequent venesection, a practice which even in the most recent times flourishes in Spain to such an extent that many of the cases of blindness, which are so frequent in that country, are ascribed to the abuse of this operation. On the other hand the practice was opposed by Don Miguel Marcellino Boix y Moliner. The Spanish Æsculapii too were particularly fond of devoting their attention to the medicine of the Ancients, i. e. of Galen and Hippocrates.

The physicians already mentioned, most of whom — particularly the Germans and English — showed themselves genuine successors of Hippocrates, as such honored in their patient, before all things, the man. Besides their special professional education, most of them were likewise equipped with a general education, and they threw into the scale at the sick-bed their entire moral personality; in a word they united genuine humanity with a high general and special scientific education. Some of them proved themselves discoverers and productive minds, and cultivated the department of monography with constant regard to the practical aim of medicine.

Besides these, many other capable physicians of the 18th century furnished treatises upon separate branches of medicine. In general since this century the custom of discussing medical subjects in monographs has become more common than had been heretofore the case, a fact explicable by the constantly increasing extension of medical science.

Diseases of the skin, with the exception of the acute exanthemata and certain subordinate forms, were studied only incidentally and (save their nomenclature) scantily by the Greeks, Arabians and later physicians; for since the days of Hippocrates they had been regarded as mere incidental expressions and results of internal diseases, or as critical and desirable discharges of morbid matters. This continued to be the case down to the time of Mercurialis and the Ulm physician Samuel Hafenreffer (died 1660; "Nosodochium, in quo cutis affectus traduntur"), and even the investigations of the Englishman Daniel Turner (1667-1741, "Treatise on the diseases incident to the skin", London, 1714) and Astruc continued incomplete. The first classification, after the method of Linnæus, into maculæ, pustulæ, vesiculæ, bullæ, papulæ, crustæ, squamæ, callositates, excrescences, ulcers, parasites, and diseases of the nails and hair was introduced by J. Jac. von Plenck (1732–1807; "Doctrina de morbis cutaneis", 1776), professor in the "Josephinum" at Vienna. Anne Charles Lorry (1725–1785), professor in Paris and a busy practitioner, then introduced better observations and methods of treatment, and Cotugno, the elements of the pathological anatomy of the skin. The famous Robert Willan (1757–1812) of London was, however, the first to lay down more careful principles of classification (similar to those of Plenck) and to furnish plates of the various diseases. His work ("Description and Treatment of Cutaneous Diseases", 1798), before the completion of which Willan died, was continued by Thomas Bateman (1778–1821), also of London. This system recognized the classes of papulæ, squamæ, exanthemata, bullæ, pustulæ, tubercula and maculæ. These two physicians are now considered the pioneers in the department of skin diseases, while the German Plenck has been compelled to resign this reputation. Among the rarer skin-diseases described in the 18th century we may mention sclerodermia (Curzio, 1752) and ichthyosis (Henry Baker, 1775, and Tilesius in Leipzig, "Stachelschweinmenschen", 1802).

Diseases of the intestines enjoyed only a comparatively slight cultivation, for the hæmorrhoids and portal stagnation of Stahl, and the doctrine of infarctus were still too strongly accepted. Friedrich Hoffmann led the way in the study of diseases of the œsophagus, pancreas and liver.

[The poet Mark Akenside (1721–1770) wrote on dysentery (1764), and Matthew Baillie of Edinburgh was the first writer to describe accurately (1793) the morbid anatomy of gastric ulcer. (H.)]

On the diseases of the peritoneum (up to this time not recognized as independent diseases) a monograph was written in 1785 by Joh Gottlieb Walter, after the subject, like so many others, had been already studied by Morgagni, who gave the impulse to so many special investigations. The latter had already studied the diseases of the urinary apparatus or the kidneys, when Michele Troja undertook the discussion of the same subject.

On the diseases of the lungs, with which in our own century physicians occupied themselves almost exclusively for more than a generation, until diseases of the nervous system began to serve as the peculiar sphere of activity of its second half, there still prevailed great obscurity during the last century, and "dropsy of the chest", "asthma" etc. played a specially great rôle among the older physicians, as indeed they did far down into the present century. Under the head of asthma was classed also

Pseudocroup, which John Millar[1] (hence the name asthma Millari down to the present day) and Chr. Friedrich Elsner, professor in Königsberg, described. True croup had been carefully investigated by Home, and in 1778 by Christian Fr. Michaelis (1754–1814), professor of surgery in Marburg, and tracheotomy[2] was recommended after the ineffectual employment of emetics and blistering plasters. Boerhaave gave hints upon œdema glottidis in his inflammation "in musculo albo glottidis", and likewise furnished evidence how little clearness there was at that time in the anatomical views of even the most famous physicians.

Under the head of "Dropsy of the chest" was classed a considerable number of diseases not as yet thoroughly differentiated from each other, as e. g. emphysema, concerning which Morgagni offered some explanations.

Catarrhs of the lungs and bronchi were not as yet distinguished (indeed there were still opponents of Schneider), and the same was the case with regard to pleuritis and inflammation of the lungs, both of which were called "peripneumonia", as in the days of Hippocrates. Morgagni was again the first to advocate the separation of these two diseases, though it was opposed by Haller, Tissot and Stoll. These diseases were discussed by Huxham, Sam. Gottl. Vogel, Borsieri, Stoll and others.

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1. Millar was a Scotch physician who settled in London about 1768. His "Observations on asthma and on the whooping-cough" appeared at London in 1769. (H.)
2. According to Gordon Holmes, the double canula was introduced by Geo. Martin, at the suggestion of a nurse.

Phthisis, so often divided from the days of antiquity down, was enriched by the "laryngeal and bronchial tuberculosis", first brought forward by Borsieri. Chronic pulmonary tuberculosis was called "nodular or ulcerative phthisis", and was studied by Boerhaave and van Swieten, and particularly by Sauvages, who adduced a very large number of "species".

[In England the disease was discussed, among others, by Sir Richard Blackmore (1724), Sam. F. Simmons (1781), Thomas Reid (1782), Michael Ryan of Kilkenny (1788) and the famous Thomas Beddoes (1754–1808), professor of chemistry in Oxford, subsequently a practitioner in Bristol. The latter ascribed the disease to an excess of oxygen in the lungs, and proposed to antagonize it by the inhalation of carbonic acid. Indeed he erected in Bristol a pneumatic hospital for the inhalation of gases in various diseases. (H.)]

Diseases of the heart were very carefully studied by the Iatro-mechanic Hipp. Franc. Albertini (1661–1738) of Crevalcuore, and the famous Pierre (Jean Bapt.) Sénac (1693–1770), of Lombez in Gascony, a province which was the birthplace of several important French physicians during the last century. Sénac was royal physician, and distinguished himself by calling attention to the uncertainties of diagnosis in cardiac affections. His "Traité de la structure du coeur" etc. (1749) was founded upon observation and pathological anatomy, and is the first work to recommend puncture of the pericardium, an operation first performed, however, by Larrey. Diseases of the arteries, especially aneurisms, were studied by Morgagni and the French surgeon Pierre Foubert (1696–1766). According to Proksch, Morgagni was acquainted with syphilitic lesions of the aorta etc., and even of the cerebral arteries.

Diseases of the nervous system enjoyed equal attention. Thus neuralgia of the infraorbital nerve, already known to the Arabians, was rediscovered by Nic. André (1756), a surgeon of Versailles, and observed by Sauvages and several times by Fothergill. Blunt already employed electricity "with success" in its treatment. Sir Henry Halford (1766–1844) also wrote upon this subject. Ischias was described by Cotugno (hence the name malum Cotunnii).

The doctrine of diseases of the brain, like that of the lungs, was still burdened by such general terms as "phrenitis" etc. Morgagni was the first to speak of "meningitis", while Robert Whytt (1768, Whytt's disease) of Edinburgh, to whom science owes so much, and Fothergill studied the subject of hydrocephalus acutus internus under this title, and the subject was also discussed by Edward Ford and in 1794 by K. Fr. Bader (Geschichte der Wassersucht der Gehirnhölen). Hoffmann and his pupil Büchner cleared up the subject of "apoplexy" by demonstrating the extravasation of blood. Finally Chr. Gottlieb Ludwig (1709–1773), professor in Leipzig, led the way in the study of diseases of the spinal cord, and Richard Powell (1766–1834) discussed diseases of the brain and nerves. Among the convulsive diseases we have already pointed out that epilepsy was studied by Tissot. The same thing, however, had been already done by van Swieten, while a monograph had been written on catalepsy by the famous surgeon P. Dionis. Eclampsia, particularly puerperal eclampsia, which Sauvages first distinguished as a special form of convulsion, was frequently discussed, especially by the great obstetrician Denman, by J. C. Gehler in Leipzig, by the Frenchman Blaud, and by G. C. Petri (1633–1718) in Erfurt. The picture of St. Vitus's dance was again carefully sketched by Sauvages and Cullen, and the disease was described at length by G. Spangenberg in Göttingen. Hysteria was discussed by Fr. Hoffmann, Astruc, Tissot, Alex. Wilson and by Joh. Gottlob Leidenfrost (1715–1794), of Ortenberg in upper Hesse, professor in Duisburg.

In addition to such books as Becher's "Medicinische Schatzkammer" etc , 1700; Loew's "De morbis infantum", 1719; especially Nils Rosén von Rosenstein's "De morbis infantum", 1752; Geo. Armstrong's "An account of the Diseases most incident to children", 1777; C. J. Mellin's "Der Kinderarzt", 1783; C. Girtanner's "Abhandlung über die Krankheiten der Kinder", 1794; M. Underwood's "Treatise on the Diseases of Children", 1784, which was long so highly esteemed, even in Germany, that it was reprinted down to very recent times; Alex. Hamilton's "A treatise of Midwifery etc.", Edinburgh, 1780, and William Cadogan's "Treatise on the Feeding of Children until the Third Year of Life" (1748); J. J. Mastalier (died 1793) and A. Gölis (1764–1827; "Praktischen Abhandlungen über die vorzüglichsten Krankheiten des Kindesalters", Vienna, 1815) in Germany, rendered eminent service in the discussion of the practical treatment of children.

Our knowledge of chlorosis was first improved by Friedrich Hoffmann, and that of scrofula by Bordeu, the surgeon Faure, Baumès, Alexis Pujol of Pujol (born 1739) and finally by Karl Georg Theodor Kortüm (1765–1818), physicus in Stollberg and Aachen, and not to be confounded with the author of the "Jobsiade", Carl Arn. Kortüm (born in Mülheim on the Ruhr 1745, died 1824; the Jobsiade[1] appeared in 1784) a physican of Bochum. [In England the subject of scrofula was discussed by Richard Russell in 1750 and by Thomas White in 1784. (H.)]

The famous James Lind (1736–1794), Ludw. Rouppe and Poissonier Desperrières wrote upon the scurvy; William Grant (died 1786) and others on the gout. [Scurvy received considerable attention from English physicians, and to Lind we may add Antony Addington (1753), Charles Bisset (1756), Nathaniel Hulme (1768), David Macbride (1778), Sir Francis Milman (1782), and above all Thomas Trotter (1785), who also wrote a "Medicina nautica", or general treatise on the diseases of seamen. Gout too was studied in England with a truly national predilection. Among the numerous treatises upon this subject we may add those of Wm. Musgrave (1703), Francis Clifton (1714), the eminent Geo. Cheyne (1720), William Stukeley (1734), Thos. Thompson (1740), Dale Ingram (1743), John Cheshire (1747), David D'Escherny (1760), Will. Cadogan (1764), William Stevenson (1779), John Gardiner (1792), George Wallis (1798) and Clifton Wintringham Sr. (1714). (H.)]

The subject of syphilis was carefully studied by: Boerhaave, Dan. Turner (1724), Astruc (according to Proksch, he wrote a text-book of "wonderful thoroughness" upon this subject, the "De morbis veneriis libri novem", 2d ed. Paris, 1740, in which he also treats of the bibliography of the disease); Morgagni, Dom. Cirillo, Carl Wilh. Nose (1780), Sanchez, Van Swieten, Girtanner, who, according to Lefebure de St. Ildefont, published an important bibliographical work on syphilis (Proksch); John Hunter, Franz X. Swediaur (1748–1824; graduated in Vienna in 1772), a physician of London and Paris; J. J. Gardane; the eminent John Andree (1779), professor of surgery and anatomy in London, who described accurately the characteristics of the true chancre before Hunter, and pointed out the seat of the so-called gonorrhœal orchitis in the epididymis. He also pointed out the inflammation of the spermatic cord (Proksch); J. J. Plenk; William Dease (1789), a surgeon of Dublin; John Douglas (died 1759); Francisco X. Balmis in Madrid; Andr. Vacca Berlinghieri in Pisa; Pietro Ant. Perenotti di Cigliano; Jesse Foot (1792) of London and others.

The syphiloid disease (Radesyge, Spedalskhed, Frambœsia, Yaws, Pian) was described by: Roland Martin; Joh. L. Odhelius; Wilh. Gg. Pfefferkorn; Ed. Thomas; Godf. W. Schilling; Friedr. Kusemüller; Bern. Peyrilhe (cf. Proksch; "Ueber die Leistungen auf dem Gebiete der Syphilidologie im 18. Jahrh.", sep-Abdr., Wien, 1887, Bergmann u. Comp).— A Dr. Conton invented the so-called "condom", but was forced to change his name and residence in order to escape the enmity of his colleagues and fellow-citizens (L. c.).

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[1] "Die Jobsiade, ein komisches Heldengedicht in drei Theilen". The first part appeared in 1784, the last two in 1799. A very well-known comic epic in Germany. (H.)

Haller, by the injection of putrefying matters into the veins, proved the existence of "septic" poisons, and prepared the way for the doctrine of septicæmia.

Pole in 1775, and Matthew Dobson in the same year, demonstrated the existence of grape-sugar in the urine, and John Rollo [of Woolwich, an English naval surgeon] wrote an extended monograph upon this subject ("An account of two cases of diabetes mellitus etc., London, 1797). Peter Büchner pointed out the softening of the bones in rhachitis, in which he was followed by Vacher de la Fleutrie, while the difference between rhachitis and cretinism was pointed out by the anatomists Jos. and Carl Wenzel. Cretinism was described by Jacob Fid. Ackermann, and then in 1796 by Franc. Emman. Foderé (died 1835), the famous professor of legal medicine in Strassburg, and by Phil. Gottfr. Michaelis. — By the injection of water into the veins and the production of dropsy Stephen Hales (1733) offered a contribution to experimental pathology, and Donald Monro (1756) furnished a monograph also on dropsy.

The comparative pathology of men and animals was called into existence by J. P. Frank (1790) and the Harburg physician Bergmann (1804), and this branch was subsequently amplified by Heusinger.

The doctrine of euthanasia was introduced as something new in 1794 by the Hollander Paradijs.

In addition to monographs, collections of observations appeared from the pens of Lentin, Pascal, Jos. Ferro (1749–1809) in Vienna, a writer on the plague, and by the famous surgeons A. G. Richter, Mursinna and others.

A second new branch was founded in the 18th century by a German practitioner in his famous book entitled "Versuch einer allgemeinen medicinisch-praktischen Geographie", 3 vols., Leipzig, 1792–95. The author of this work was

LEONHARD LUDWIG FINKE (1747–1828), physikus and professor in Lingen. In it the geographical location of diseases, upon which Hippocrates had laid such great weight, was again taken into merited consideration, and at the same time medicine was brought into closer relation with the general sciences, from which, by the establishment of the barriers of distinct departments, it had been disunited since the days of the Ancients (and is again to-day). The renewal of this union, however, achieved its greatest success through the cultivation of the

HISTORY OF MEDICINE,

a branch properly speaking created by the Germans in the 18th century, or, at all events, if this statement is not accepted, a branch which since that period has fallen more and more into the hands of the Germans, so that until recently medical history was to be called a peculiarly German department of science.

At the head of this department we name the most important medical historian of the English down to the present day,

JOHN FREIND (1676–1728),

who has, indeed, been surpassed in many respects, and yet is very reliable and conscientious. He begins with the age of Galen (where le Clerc had stopped) his "History of Physic from the time of Galen to the beginning of the Sixteenth Century", London, 1725–26. This work was often translated.[1] Like an Englishman, Freind considers the history of medicine from the stand-point of the practitioner. He fell into a bitter quarrel with le Clerc's brother John in consequence of some of his opinions. Freind was also a zealous Iatro-mechanic, and in this theory discussed even the doctrine of "menstruation". The latter he regarded, on the whole, as a means for the preservation of health in women, from its removal of the superfluous blood, which, during pregnancy, served as nutriment for the fœtus.

The life of Freind is very interesting. Born at Croton in Northamptonshire, he for a time taught chemistry in Oxford. Next he was appointed army-physician, and went in this capacity with the English army to Spain and Holland. In 1713 he settled as a physician in London, received a seat in Parliament, and spoke decidedly against the imprisonment of a bishop. Accordingly Sir Robert Walpole cast him into the Tower. The noble Mead, a friend of both Freind and Boerhaave, though a scientific opponent of the former, effected Freind's release by declaring, when the omnipotent minister called Mead to attend him in sickness, that he would not undertake his case until Freind was released. Mead afterwards gave Freind 5000 guineas received from the latter's practice during his imprisonment. Freind was also from 1727 ordinary physician to the queen.

[The dearth of English medical literature in works upon the history of medicine is the more surprising, since English literature in general can point with just pride to its achievments in the field of general history. We need mention only a Hume, a Gibbon, a Bancroft and a Prescott, to show that the English-speaking peoples are by no means deficient in the historic bent. But, even among the Americans, who in the last quarter of a century have adopted so many medical fashions from Germany, the department of the history of medicine has remained almost a *terra incognita*.

Besides Freind, the most important English medical historian down to the present day, medico-historical subjects were studied in the 18th century by: Francis Clifton of London, who published in 1732 his "State of physic, ancient and modern"; William Northcote, an English naval surgeon, who wrote "A concise history of anatomy from the earliest ages of antiquity" (London, 1772); John Aikin (1747–1822), an associate of the philanthropist Howard, who published in 1780 his "Biographical memoirs of Medicine in Great Britain, from the Revival of Literature to the time of Harvey". It is said that Aikin originally intended to write a complete history of English medicine, but was discouraged by the little interest and co-operation manifested by his colleagues in his design, and accordingly limited his labors to mere biographical sketches. William Black (1750–1829) of London also published in 1782 "An historical sketch of medicine and surgery from their origin to the present time", a work translated into German and French. H.]

The earliest German medical historian of the 18th century was that thorough student of antiquity and conscientious writer,

Joh. Heinrich Schulze, a pupil of Hoffmann. His works were entitled "Historia medicinæ a rerum initio ad annum urbis 535 deducta" (Lipsiæ, 1728), and "Compendium historiæ medicinæ a rerum initio usque ad Hadriani Augusti excessum" (Hal. 1741).

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1. Into Latin by John Wigan (1732), who also, with Freinds's co-operation, edited an elegant edition of Aretæus in 1727; into French by Étienne Coulet (1727). The defects of this latter translation led the author to authorize a new French translation by B * * *, and the latter was published at Paris by Sénac in 1728. (H.)

Daniel Wilhelm Triller (1695–1782) of Erfurt, professor in Wittenberg, also wrote some "Opuscula medica", Frankfort and Leipzig, 1766–1772. Triller was a poet of the school of Gottsched.

Joh. Jac. Reiske, the orientalist, wrote on Arabian and Hebrew medicine, a work in which he was aided to some extent by his learned wife.

Joh. Ernst Hebenstreit, on the other hand, wrote on the therapeutics of the Ancients. He was born in Neustadt on the Orla, and in the years 1731 to 1733 travelled in Barbary under the commission of king Augustus I. of Poland and Saxony, called from his sexual capacities "the Strong". Subsequently Hebenstreit became a professor in Leipzig, rising gradually from professor of physiology to that of anatomy and surgery, and then to the highest of all in that day, the chair of pathology.

Far more important was the learned and thorough investigator of history, founder of historical pathology, and classical writer,

Phil. Gabriel Hensler (1733–1805), the friend of Lessing. Lessing himself originally intended to study medicine, and subsequently came very near becoming a medical historian, as he proposed to write a history of syphilis. He abandoned the idea, however, when he heard that Hensler had the subject under consideration. Hensler was likewise something of a poet. His chief works are "Geschichte der Lustseuche, die zu Ende des XV. Jahrhunderts ausbrach" (1789) and "Vom abendländischen Aussatze im Mittelalter, nebst einem Beitrage zur Kentniss und Geschichte des Aussatzes". — Hensler recommended gymnastic exercises for health even earlier than the Swede Peter Henrik Ling (1776–1839). They were recommended especially in diseases of the internal organs, and Hensler also recommended deep inspirations in diseases of the lungs.

The son of a minister, Hensler was born at Oldesworth in Schleswig, attended the gymnasium at Husum and Schleswig, completed his studies in theology, and then abandoned this science and studied medicine, which he completed in two years. At first he went as physician to Preetz, then became physicus in Segeberg and Altona, was honored with the title of archiater, and finally made a professor in Kiel.—Besides his historical works, Hensler was equally distinguished as a practitioner. He demanded as the chief requisites of a practising physician "that he should be a good man, combining honesty, humanity and artistic sense with a disposition to science." "It is, however, just so! There is no art in which one learns to walk without making a false step. It is a misfortune that our false steps may so easily prove fatal; but this lies in the very nature of our art. Otherwise too it would not be so salutary. The carpenter breaks his arms and legs more readily than the tailor. Is that a ground for reproach?"

Partially as the result of Hensler's activity in the medico-historical department, the history of medicine was also made the subject of study by the famous

Joh. Christ. Gottlieb Ackermann (1756–1801) of Zeulenroda, professor in Altdorf near Nuremberg (Institutiones historiæ medicinæ Norimb., 1792); then the thorough and unprejudiced

Joh. Karl Wilh. Möhsen (1722–1795) of Berlin, author of a "Geschichte der Wissenschaften in der Mark Brandenburg, besonders der Arzneiwissenschaft, von den ältesten Zeiten bis zu Ende des 16. Jahrhunderts," 1781; "Verzeichniss von Bildnissen grösstentheils berühmter Aerzte" etc.; also

Joh. Fried. Karl Grimm (1737–1821) of Eisenach,

ordinary physician in Gotha, who wrote a translation of Hippocrates, 4 vols., Altenburg, 1781–1791;

Christ. Fried. Gruner (1744–1815) of Sagan in Silesia,

a professor in Jena, the most zealous student of the ancient physicians, also devoted his attention to Hippocrates.

In addition to Ackermann the following physicians distinguished themselves by literary collections: the great

Haller and

Ernst Gottf. Baldinger (1738–1804).

The famous savant last mentioned was born at Vargula near Erfurt, was originally an army physician, then physikus in Langensalza, and subsequently a professor in Jena, Göttingen, Kassel and Marburg, one after the other. He also distinguished himself as an author on army medicine. His library is still in Darmstadt.

The following physicians must also be mentioned as historical writers:

Joh. Fried. Blumenbach,

who wrote an excellent "Introductio in historiam medicinæ literariam", Göttingen, 1786, after which the honest, sober and dry

Joh. Daniel Metzger (1739–1805),

a professor in Königsberg, chiefly constructed his own work.

A. F. Hecker (1763–1811), of Kutten near Halle,

a protessor in the university of Erfurt (belonging at that time to the electorate of Mayence) and finally professor in the Collegium medico-chirurgicum at Berlin and then in the university. He surpassed in intellectual capacity his more famous son Just. Friedrich Karl Hecker (1795–1850), professor in Berlin, who was, alas, often too verbose, and may be called the romancer among medical historians. — The first historical writer upon the subject of midwifery among the Germans was

Fr. Benj. Osiander.

The best known historical writer in the department of medicine, distinguished for his profound erudition and exceedingly extensive reading, yet free from all pedantry, correct and candid in judgment, in diction simple and yet forcible, not, indeed, entirely unprejudiced (as may be readily understood, especially when we consider the tendencies of his time), but truthful and loving the truth, in spirit belonging entirely to the 18th century, and chronologically to its latter half and the first third of the 19th, was the world-famed

Kurt Polycarp Joachim Sprengel (1766–1833) of Boldekow in Pomerania.

The son of a minister, he began in 1784 the study of theology, but then transferred his attention to the natural sciences and medicine. In 1787 he began to practise in Halle, but two years later was appointed professor of medicine there, and in 1797 received in addition the professorship of botany. The latter science was the favorite branch or recreation of Sprengel, as of many physicians during the 18th century, and to it he rendered great service, particularly as regards its history, while his uncle Konrad Sprengel of Spandau advanced the theory of fructification of plants. From 1792 onward he published his immortal work, the first volumes of which had already enjoyed a second edition before the last appeared. In these different editions too his opinions regarding the same author are frequently strikingly changed.

Sprengel developed a perfectly marvellous activity. Besides his historical work "Versuch einer Geschichte der Arzneikunde", which to another would have furnished sufficient work for a whole life, Sprengel translated very much from the ancient and modern languages, and even wrote among other things an "Anleitung zur Botanik für Frauenzimmer"; "Beiträge zur Geschichte des Pulses"; "Galen's Fieberlehre"; "Apologie des Hippocrates"; "Handbuch der Pathologie"; "Handbuch der Semiotik"; "Antiquitates botanicæ etc."; "Geschichte der Medicin im Auszuge"; "Geschichte der Chirurgie" (its second volume was written by his son Wilhelm, born 1792, died a professor in Greifswald about 1820): "Geschichte der Botanik". He likewise edited Theophrastus, Dioscorides etc. and various journals — a savant and a genius such as the 18th century alone could ripen. Sprengel's works form in themselves a complete library.

The following physicians participated in a less degree in the historical investigations and writings of the 18th century.

Mich. Alberti (1682–1757), "Medic. Theorieen"; Andr. O. Gölicke, "Hist. medicinæ universalis"; Chr. Wilh. Kestner, "Kurzer Begriff der Historie der medicin. Gelahrtheit"; Gottlieb Stolle (was not a physician), "Anleitung zur Historie der medic. Gelahrtheit"; Fried Börner (1723–1761), "Programma de vera medic. orig." etc., "Noctes Guelphicæ" etc.; Georg Matthiæ (died 1773), "Conspect. hist. medicorum chronologicus"; Polycarpus Fried. Schacher (1676–1737) in Leipzig, "De feminis ex arte med. claris"; Kortüm (author of the "Jobsiade"), "Skizze einer Zeit- und Literaturgeschichte der Arzneikunde"; Phil. Ludwig Wittwer (1752–1792), "Archiv für Geschichte der Arzneikunde", 1 vol.; Carl Gottl. Kuehn (1754–1840), professor of physiology and pathology in Leipzig, "De philosophis ante Hippocratem medicinæ cultoribus ad Celsi de medicina præf.", "Medicorum Græcorum opera quæ extant", 20 vols., 1821–30; F. L. Augustin, "Vollständige Uebersicht der Geschichte der Medicin in tabell. Form" and many others.

In Holland Joh. de Gorter, among others, occupied himself with historical studies.

French.— Ant. Portal, "Histoire de l' anatomie et de chirurgie", 1770; Théophile de Bordeu, "Recherches sur quelque points d' historie de la médecine" etc.; Goulin, "Mémoires litteraires" etc.; Étienne Tourtelle, "Histoire philosophique de la médecine"; Lepecq de la Cloture and others.

Italians. — Antonio Cocchi (1695–1758) of Mugello, professor of anatomy in Florence; Giov. L. Bianchoni (1717–1781) in Rome, for a long time physician-in-ordinary at the court of Hesse-Darmstadt, then at that of the Elector of Saxony, and finally a count and embassador at Rome; Leonardo Targa (1730–1815) of Verona, both the latter well known for their labors upon Celsus, and all three capable historians.

Danes. — de Meza, "Tentamen historiæ medicinæ".

Among the physicians who sprung from the spirit of the 18th century, and who occupied themselves with historical writing, belongs also the Spanish historian

A. **Hernandez Morejon** (1773-1836), of the village of Alaejos in Old Castile, author of "Historia bibliografica de la Medicina española", 7 vols., Madrid, 1842-52.

Sprung from poverty and tossed about by the Franco-Spanish campaigns and the political storms of the age of Napoleon, after many vicissitudes of fortune he was able by his own energy and strength to secure the appointments of clinical professor in the college of surgery of San Carlos in Madrid, royal court-physician and member of the Supreme Council of Health. He labored upon his colossal work until his death.

Semeiology too, which, as we have seen, had been revived in the 16th century after the manner of the Ancients, took in the 18th a new flight, while in the 17th century, as in our own, it was considerably neglected. From the works on this subject we may mention: Ch. Vater's "Semiotica medica", 1725; Friedrich Hoffmann's "Fundamenta semiotica medicinæ", 1749; Samuel Schaarschmied's "Semiotik", 1756; G. E. Hamberger's "Semiotische Vorlesungen über Jodoc. Lommius", edited by Graun, 1767; J. N. Pezold (1778); C. G. Gruner (Semiotice, 1775); F. A. Weber's "De signis et causis morborum", 1786; F. G. Danz (Semiotik, 1793); J. Ch. A. Heinroth (Allgem. med. Zeichenlehre etc., 1793); Kurt Sprengel (Handbuch der Semiotik), whose work was the most popular of its day.

4. SURGERY (OPHTHALMOLOGY, OTOLOGY AND DENTISTRY).

The 18th century is distinguished as one of the most important in the history of surgery also by the fact that it finally conferred upon this art a rank which placed it in all respects firmly and permanently upon an equal grade with the so-called internal medicine. This is true as regards both the scientific and the practical side of this art, and likewise as regards the social rank of its higher representatives. The impulse to all this advance again proceeded from France, the headquarters of modern surgery, where even the curious dispute about rank between medicine and surgery, i. e. between physicians and surgeons, was first finally decided. The surgery of the

a. French

accordingly exhibits in this century a great number of its most brilliant representatives. Indisputably the most influential, though not the most considerable of these was

François Gigot de la Peyronie (1678–1747) of Montpellier.

Director of the Académie de Chirurgie, which he, in conjunction with Mareschal, had founded in 1731, and surgeon to the king, filled with noble enthusiasm for his own special branch, he employed his considerable wealth almost entirely for the elevation of surgery. Thus, in addition to the five surgical professorships established in 1724, he founded a sixth at his own expense, and gave each professor an assistant. He likewise effected the foundation of four professorships of surgery in Montpellier. Upon the incumbent of the chair which he had founded in Paris he laid the obligation of lecturing on obstetrics to the surgeons and midwives. In 1743 he effected the separation of the surgeons from the barbers, and, besides all this, in his will he devoted all his remaining estate to the objects to which he had also dedicated his life. As a surgeon he rendered special service in wounds of the intestine and in operations for hernia. — The most famous, and scientifically the most influential surgeon of this early period was, however,

Jean Louis Petit (1674–1750) of Paris,

likewise a director of the Académie de Chirurgie, and a professor who had served from the ranks upward and educated himself especially in practical surgery in the wars. His fame was so great that he was called even to Poland to treat Augustus the Strong, and also to Spain, and some sovereigns, among them Frederick the Great, requested some of his pupils for field-surgeons. His services extended over the whole field of surgery, including opthalmology, in which latter science he was acquainted with measurements of the eye, the contraction of the pupil after division of the sympathetic etc. Especially worthy of mention are his screw-tourniquet, amputation à deux temps, his knowledge of the definitive thrombus after ligation (Wernher claims that he was the first to observe this), acupressure (an experiment), and herniotomy without opening the sack. His chief works were entitled "Traité des maladies des os" etc., Paris 1723, and "Traité des maladies chirurgicales et des opérations" etc., published by M. Lesne, Paris 1774–83.

Réné Jacques Croissant de Garengeot (1688–1759),

professor in the Collége de St. Côme, discarded the introduction of tents of lint after herniotomy, performed tracheotomy with a canula, invented a special turnkey and restored a nose which had been cut off and had lain for a considerable time upon the ground. His method of curing hernia consisted in pushing the unopened hernial sack into the inguinal canal (Bruchpforte?) and fixing it there until the two surfaces united. He furnished a theory of hernial formation, though in this he was preceded by Renaulme de Lagaraune (1721), who was the first to bring forward such a theory (Wernher). Garengeot's chief work was entitled 'Traité des opérations de chirurgie", Paris, 1720. — More important was the Parisian surgeon

François Sauveur Morand (1697–1773),

equally famous as a man and a surgeon, who after

Henri François le Dran (1685–1770),

also a surgeon of Paris, had performed disarticulation of the upper arm — le Dran distinguished himself also as a lithotomist and military physician — performed the first disarticulation of the thigh. Morand also occupied himself with paracentesis of the chest, abdomen, ovarian tumors etc., and in 1753 was the first to describe a case of osteomalacia. He advised the use of the hot iron to check hæmorrhage whenever haste was required, or the great number of the vessels rendered ligation difficult. — Le Dran was one of Haller's teachers. His chief work was entitled "Traité des opérations de chirurgie", Paris, 1742.

Claude Nicolas le Cat (1700–1768) of Blérancourt

was particularly famous as a lithotomist. In the operation of lithotomy he recommended to keep the wound diminishing in size from without inward, and is well known also for his recommendation of a rare bandage, and for peculiar views upon gunshot wounds. He was too an opponent of the lithotomist

Frère Côme (Jean Baseilhac, 1703–1781) of a village near Tarbes,

a monk who by means of the lithotome caché operated from within, and removed cataract by an oblique incision into the cornea.

Jean Astruc (1685–1766)

deserves mention as an eminent historian of syphilis and a syphilographer of extensive knowledge, who utilized pathological anatomy in his studies of the venereal disease and thus became acquainted with visceral syphilis. He was a famous literary swordsman, and devoted some attention to the theory of midwifery.

François Quesnay (1694–1774) of Merey,

the undaunted physician of Louis XV., who, to the king's question on what theory he would rule, replied in the famous words "On none! I would let the laws rule!" Quesnay was also an eminent writer on political economy and founder of the so-called physiocratical system of government. [In medicine he is best known perhaps by his "Histoire de l' origine et des progrés de la chirurgie en France", Paris, 1749.]

Brasdor (Pierre, 1721–1776),

well known for his method of ligation in aneurisms (below the sack), as well as for his treatise on fracture of the clavicle and on disarticulations.

HUGO RAVATON (about 1750),
a very clever military physician, who discussed gunshot wounds in an excellent manner, and recommended amputation with two flaps, while

GEORGE DE LA FAYE (died 1781)
modified le Dran's incision for disarticulation of the shoulder and was also a capable oculist, removing the lens by simple pressure after making an incision with the cataract knife, which he first devised.

Loubet, an army-surgeon, Delaisse, a surgeon of Montfort, and l' Amaury also enjoyed considerable reputation. The same was the case particularly with Claude Pouteau (1725–1775) of Lyons, who favored the use of moxas, which Larrey too subsequently called his good friends. Adrien Simon Boy (died 1795 at Alzey in Rheinhessen), a physician of the Army of the Rhine, [was also distinguished as a surgeon and as the author of an excellent "Traitement des plaies d' armes à feu", 1795.]

THOMAS GOULARD,
at first a surgeon in Alet, then a professor in Montpellier, introduced into surgery the use of preparations of lead, and even at the present day his name is probably the best known of all physicians from his "aqua Goulardi".

JEAN COLOMBIER (1736–1789)
wrote the first handbook of military hygiene.

ANTOINE LOUIS (1723–1792) of Metz,
the permanent secretary of the Académie de Chirurgie and a protégé of la Peyronie, to whom he continued attached by gratitude all his life, was a surgeon of considerable and well-merited reputation. He served in numerous wars, and distinguished himself also as a forensic physician. He was likewise the first who held a public disputation on the occasion of his reception into the Académie of surgeons In his quarrels with the physicians he proved himself ready in blows and adroit in speech. His chief works were entitled "Cours de chirurgie pratique sur les plaies d' armes à feu", Paris, 1746, "Recueil d' observations d' anatomie et de chirurgie, pour servir de base à la théorie des plaies de tête par contrecoup", Paris, 1768, etc. Contemporary with Louis was the teacher

RAPHAËL BIENVENU SABATIER (1732–1811),
a professor and member of the Académie des Sciences. He devoted himself chiefly to anatomy and ophthalmology, but also wrote a famous treatise on operations, in which he recommended, among other things, the introduction of a card in wounds of the intestine, and the resection of the head of the os brachii. Both the foregoing surgeons, with others, were teachers of the most considerable surgeon of that day, the great

PIERRE JOSEPH DESAULT (1744–1795),
a man remarkable for the whole course of his life. Desault was the son of a farmer of Magny-Vernois (near Lure, so well known since 1870), poor, but blessed with children and was originally destined for the priesthood. Without any disposition for this profession, after a thorough study of mathematics, he took up surgery, beginning his studies with an ignorant master of his native town. Thence he went to Belfort and subsequently to Paris, where he supported himself by teaching mathematics. He soon rose step by step, until at last, without any preceding collegiate education, he became professor in the school of practice and chief surgeon of the Hôtel Dieu. Here he established the first surgical clinic, provided for its hygienic arrangements etc

Desault rendered service to science especially by the foundation of surgical anatomy, a science of which Dupuytren and Roux were the literary coryphæi, for Desault himself wrote nothing. He was also of eminent service in altering and improving the system of operations, in designing more appropriate instruments, in the establishment of a surgical journal etc., and particularly in the education of many able pupils. Like all truly great surgeons after Würtz, he was an opponent of trepanning, an operation still greatly abused in the last century, and employed in almost all injuries of the skull. Desault was likewise a champion of healing by *prima intentio*. Toward the close of his life persecuted by the Revolutionists — his last patient was the unfortunate Louis XVII. who, as now shown, died of scrofulosis — he died suddenly of an affection of the brain. His trusty friend François Chopart (1743–1795), from whom a well-known form of amputation of the foot has received its name, followed him speedily to the grave.

The following surgeons of this golden age of French surgery must also be mentioned:

PIERRE SUE (1739–1816) of Paris,

professor of surgery in 1767, and subsequently physician to Joseph Beauharnais. In 1812 he was chief physician in the campaign against Russia and, after the fall of Napoleon, court-physician under Louis XVIII. Sue was a fertile author on surgery and obstetrics.

Jean Juville, to whom we owe an improvement in the construction of trusses; Pipelet, who rendered service in the subject of hernia and was expelled from the Académie for charlatanism; Jean Pierre David (1737–1784) of Rouen, who described necrosis; C. A. Lombard (1741–1811) and François Laur. Marchall of Strassburg, who performed the first amputation of the cervix uteri; Goursault, who performed the first œsophagotomy in 1738; Delacroix in Orleans (amputation at the hip); Jean Jacques Belloc (1730–1807), inventor of Belloc's canula, who was first a surgeon, then a physician in Agen and finally professor of forensic medicine in Paris; Toussaint Bordenave (died 1782); Leblanc in Orleans; Prudent Hévin (1715–1789); Henri Louis Duhamel de Monçeau (1700–1782), who made investigations upon the healing of bones and their nutrition by the periosteum, feeding animals with madder for the purpose of staining the bony tissue, though, according to Lawson Tait, John Belchier (1706–1785) anticipated him in this matter:

PIERRE FRANÇOIS PERCY (1754–1825),

a famous military surgeon under the Consulate and Empire and a writer on subjects relating to military surgery, who strongly recommended the use of cold water in gunshot wounds, and, among other things, in operations preferred in many cases the scissors to the knife. The cold water treatment was at this time a novelty.

Not a few of the French surgeons rendered lasting service to ophthalmology, particularly the operative treatment of diseases of the eye, which in the 18th century fell into the hands of scientifically educated surgeons and began to become a specialty of eminent men, instead of continuing the field of charlatans as it had been everywhere heretofore. Among these French oculists we mention

CHARLES DE ST. YVES (1667–1736) of Paris,

who correctly distinguished capsular and lenticular cataract and gonorrhœal and syphilitic inflammations of the eyes (Troksch), glaucoma (a term by which he designated a form of cataract due to paralysis of the optic nerve and accompanied by dilatation of the pupil), and undertook extraction of cataract (1707). He was also the first to wash out the anterior chamber of the eye (Magnus).

FRANÇOIS POURFOUR DU PETIT (1663–1743) of Paris,

who improved the technique of cataract extraction and gave his name to the canal of Petit. A pioneer, like Graefe in our own century, was

JACQUES DAVIEL (1696–1762),
who introduced in 1750 the extraction of the lens as an independent method. He operated by means of the inferior flap method. Daviel's spoon etc. His technique was still imperfect and was improved by de la Faye.

TENON (1724–1816)
wrote meritoriously on cataract and other diseases of the eyes.

Dominique Anel's name is still borne by a syringe and probes. He performed the so-called Hunterian operation for aneurism before Hunter, and even aspirated fluid from the chest with the syringe. The following surgeons were also well-known oculists: Antoine Ferrein, who split open the capsule posteriorly to effect depression; Pierre Guérin, of the Hôtel-Dieu in Lyons; Jean Janin (1731–1799) of the same place, who declared the capsule removable and improved iridotomia, making his incision of the iris with scissors; Baron von Wenzel Sr., the zealous champion of extraction, deserves the greatest credit for his performance of iridectomy. He pierced with the cataract-knife cornea and iris together, and removed with the scissors in the chamber the flaps thus formed from the iris. Wenzel senior found in his son, Mich. Jean Bapt. de Wenzel, a worthy successor. Pierre Demours (died 1795) too, the anatomist, and his son Antoine Pierre Demours (1762–1832), rendered lasting service to the science of ophthalmology. The latter survived into the 19th century, as did also the famous Delarue (Cours complet des maladies des yeux, 1820), and Descemet (1732–1810), professor in Paris, Louis Flor. Deshaix-Gendron of Orleans, professor of ophthalmology in Paris, Pellier de Quengsy in Toulouse and others.

We will add here (after Donders) the remarkable fact that Janin first described, and described quite completely, hypermetropia, and referred it to too flat a formation of the lens. He did not, however, name it correctly. Naturally he distinguished merely healthy vision and shortsightedness, while the hypermetropia resulting from aphacia, as well as our hypermetropia and presbyopia of the present day he classes among the accidental defects of vision (Anomalies of Refraction).

Dentistry too found excellent laborers in its field. Among these were Pierre Fauchard of Paris, who wrote the first complete work on this subject "Le chirurgien dentiste, ou traité des dents" etc., Paris, 1728; Pierre Auzebi of Lyons; Lecluse, who first mentions the English turnkey; Jourdain, who brought forward appropriate instruments and new artificial teeth; P. Moulon (artificial teeth); Bourdet (artificial palate, lever), dentist to the king: Pierre Guissard etc.

The science of otology, founded by Duverney, was excited to practical advancement by the attempt at catheterization of the Eustachian tubes from the mouth, made in 1724 by the postmaster Guyot of Versailles, an operation first performed, however, by Archibald Cleland in 1741.[1] Antoine

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[1] Cleland was an English army-surgeon, and, according to Lucae, introduced the Eustachian catheter through the nose, and practised Valsalva's method of inflating the middle ear. His papers appeared in the Philosophical Transactions for the years 1740 and 1741. (H.)

Petit recommended catheterization through the nose after Julien Busson had advised the introduction of steam into the tubes. Jean Louis Petit also practised perforation of the mastoid process after the Prussian regimental surgeon Jasser had performed this operation, and Eli in Paris practised the first perforation of the membrana tympani in 1720 for deafness. Of the other Romanic peoples,

b. The Italians

were well represented in surgery, and although they had lost most of their earlier reputation, they still displayed surgeons of importance. Among these Antonio Benevoli (1685–1756), of the famous surgical headquarters at Norcia, subsequently settled in Bologna and Florence, was the first in Italy to teach that the seat of cataract was in the lens. P. Paolo Molinelli (1702–1764) and Natal Gius. Palucci (1716–1797) of Florence, Paris and Vienna (who was the first to distinguish the nucleus of the lens from its capsule, and never entirely abandoned depression), distinguished themselves as oculists, while T. Ambrosio Maria Bertrandi (1723–1765), a professor in Turin, proved himself a very important operator and universal surgeon. Beside him were ranged the two Nannoni (Angiolo, the father, 1715–1790, and Lorenzo, 1749–1812, the son), Pietro Paolo Tanaron, Nic. Capuletti, Malacarne in Turin, Girolamo Marini (wrote on surgical operations, 1723), while Dom. Cirillo in Naples, distinguished himself as a syphilographer, Gius. Flajani (1741–1808) and Mich. Troja (1747–1827) were eminent as operative surgeons, and Flajani, as well as Carlo Mondini (1729–1803), distinguished themselves also as oculists (extraction); Guattani (compression of the artery above the aneurismal sack); Moscati in Milan; Gius. Nessi (surgery, 1781). Giov. Battista Palletta (1747–1832) made himself well-known by his observations relative to spondylarthrocace and the so-called voluntary limping.

Antonio Scarpa (1752–1832) of Motta,

professor successively in Modena and Pavia, was one of the most important surgeons, and was chiefly of service in the study of herniology, diseases of the eyes (discision of cataract and irido-dialysis, or tearing the iris from its border, an operation performed before him, however, by Paolo Assalini and Franz. Buzzi in Milan, 1788, the discoverer of the yellow spot in 1782), the theory of aneurisms, their treatment by ligation, the doctrine of malformations of the feet etc. Scarpa was likewise an eminent anatomist. The most famous surgeon of this century among the

c. Spaniards,

Antonio de Gimbernat, professor in Barcelona from 1762–1774, then a surgeon in Madrid, distinguished himself equally as an anatomist and herniologist. Other reputable Spanish surgeons were Pasc. Franc. Virrey (Handbook of surgery, 1741); Mart. Martinez (New surgery, 1722); Barth. Serena and Ant. Medina (New course of surgery, 1750); Fr. Villaverde and D. Velasco (Course of theoretical and practical operative surgery, 1792).

Among the Germanic races, in fact among almost all nations,

d. The Germans

were the people with whom surgery and surgeons emerged last of all from the mediæval contempt fastened upon them by the "Church". Although even in the 17th century we had possessed not a few important surgeons, this contempt in the first half of the 18th century was still almost universal, and was not entirely lost in the latter half of the century, especially with regard to the ordinary practising surgeons, who were undoubtedly, for the most part, only ignorant popular physicians. Hence, doubtless, it resulted that it was only at a very late period among us that men of respectable social and scientific standing could devote themselves to surgery. It was partly the passion of the highest circles to imitate whatever the French did and possessed, that first led to a fundamental improvement of these conditions among us.

This was the reason why the first German surgeon of complete scientific education,

LORENZ HEISTER (1683–1758) of Frankfort-on-the-Main,

after laying the foundation of his education in Giessen, was compelled to complete his proper medical studies in Leyden and Amsterdam. As it was impossible to obtain honorable employment in German armies, it was only in the Dutch military service that he could acquire surgical experience with a respectable position. He remained in this service until it was learned by experience both abroad and at home, that there might be good German surgeons too besides the French, who up to this time had been so much sought after. Heister was now called in 1710 to Altdorf, and then in 1720 came to Helmstedt, where he developed a great activity which embraced anatomy and surgery and even botany. His books on surgery and anatomy in his time rendered him almost an autocrat in these branches. Surgery he discussed from the ordinary dressing of wounds, upon which he laid especial weight, and ligation (acupressure), to the highest surgical subjects. He also distinguished himself as a dentist and especially as an oculist, assisting to introduce into Germany the view that cataract depended upon cloudiness of the lens. In the latter matter his pupil

BURKHARD DAVID MAUCHART (1696–1751),

born in Marbach (the native place of the regimental physician Schiller), subsequently professor of anatomy and surgery in Tubingen, followed his example. He did away with the doctrine of the laceration of the peritoneum in the origin of hernia (P. Koch). His pupil Boury first introduced the term Gerontoxon (1743) in a dissertation on opacities of the cornea. (Mauchart himself published no works under his own name). A contemporary and colleague of Heister's in Halle, professor

HEINRICH BASS (1690–1754),

rendered good service, among other things, in the practice of paracentesis of the chest, which he performed after drawing the skin to one side.

In Saxony the following surgeons of importance displayed their activity:

JOH. ZACHARIAS PLATNER (1694–1747) of Leipzig,

who wrote in elegant Latin a long-popular and good text-book ("Institutiones chirurgiæ rationalis");

Justus Gottfr. Günz (1714–1754),
ordinary physician in Dresden, a good oculist and herniotomist;

Karl Friedrich Kaltschmidt (1706–1769),
professor in Jena a versatile and bold surgeon, who also devoted attention to forensic medicine. Kaltschmidt likewise made some experimental investigations relative to wounds of the liver.

In Mayence professor Joh. Peter Weidmann distinguished himself as a teacher. surgical investigator, judicious practitioner and bold operator. He is well-known, among other things, for a treatise on necrosis, translated into French by Jourdan. He said he could write all his remedies upon a single card, and of the many glittering things in his case of instruments he employed very few, however shiny they might look. In Helmstedt lived the curious saint and ingenious charlatan, the ordinary physician Gottfr. Christoph Beireis (1730–1809) of Mülhausen, who was at first professor of physics and medicine, and subsequently professor of surgery.

Prussia through its numerous wars reared a greater number of famous surgeons, for war has ever been the most excellent school of surgery. These men almost all had a "destiny", and accordingly perseverance and energy. Most of them served from the barber's bowl up, and came often from very great poverty to success of the most honorable character, free from all charlatanism. The ordinary physician of Frederick William I.,

Joh. Theod. Eller (1689–1760),
one of the founders of the Charité, was a good surgeon. The first surgeon of the Charité and the first professor of the Medico-chirurgical College, however, was

Simon Pallas (1694–1770),
whose son Aug. Friedr. (1731–1812) was likewise a professor in Berlin.

Joach. Friedr. Henckel (1712–1779),
a man eminent for his charity,[1] rendered special service to the subject of surgical dressings.

Samuel Schaarschmidt (1709–1747),
ordinary physician, was an extremely fruitful writer on military medicine, and the first surgeon in Berlin to perform lithotomy.

J. Chr. Ant. Theden (1714–1797),
who had worked himself up from poverty (Theden's dressings, Aqua traumatica Thedenii, inventor of the elastic catheter with a covering of caoutchouc etc.), distinguished himself as a field-surgeon, and was finally made surgeon-general.

Joh. Ulrich Bilguer (1720–1796) of Chur,
who studied in Basel, Paris, Strassburg and Halle, and finally became surgeon-general in Berlin, was a deserving but partial opponent of amputation, an operation which, like trepanning (and both Bilguer and Theden advocated the latter operation), was undoubtedly horribly abused. He performed the first resection of the wrist in 1762 (though, according to other authorities, a Dr. Beyer anticipated him in the same year, after the battle of Freiburg).

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[1] At his death he bequeathed 1,000 thaler (a great sum in that day) for the free education of a student of medicine or surgery. The latter received the interest upon this sum for three years.

Joh. Leberecht Schmucker (1712–1786)

occupied the post of surgeon-general under Frederick II., and proved himself an eminent surgeon by his opposition to trepanning and his introduction of the treatment of injuries of the skull by cold poultices. He also recommended millepedes as a snuff in amaurosis. The same office was filled by J. C. F. Voitus (1745–1787) of Genthin, son of a poor rector of a school.

Another surgeon-general was

Christ. Ludwig Mursinna (1744–1823),

the son of a weaver of Stolpe in Pomerania, who for a long time practised his father's trade and then began his surgical career among the bath-keepers.

Johann Görcke (1750–1822),

a humane, meritorious, indefatigable and highly-esteemed physician, organizer of the Prussian medical department, attained the position of surgeon-general from that of the son of a poor minister of East Prussia.

In Austria surgery did not owe its success to the daily profit reaped in war so much as in Prussia, but rather to the great and ever active spirit of Joseph II., a monarch to whom nothing human was foreign. He, almost alone among all monarchs, had a heart for the people, and continued, even upon the throne, to be a man of his people in the best sense of that expression. But, alas, when he anticipated that death would grant him no time for quiet action, he overturned everything, including even that which he had proposed with regard to medicine and surgery, branches upon which he intended to bestow, and had in part actually bestowed, great advantages. From the very outset he had done harm by his undue patronage of the surgeon next mentioned, to whom he entrusted the arrangement of the so-called Josephinum. I refer to Joseph's surgeon-in-ordinary,

Joh. Alex. von Brambilla (1728–1800) of Pavia,

who was also surgeon-in-chief. Useful as he was in elevating the surgical profession of Austria, Brambilla, in reliance upon the favor of Joseph, in many respects went too far, and particularly in his excessive preference of his so-called medico-chirurgeons to the physicians. He also wrote a history of surgery. He was succeeded in the position of chief of the Austrian department of military hygiene by

Matth. Mederer,

from 1773 to 1796 professor of surgery in Freiburg in the Brisgaw, a city at that time belonging to Austria. Mederer, like the earlier Paracelsus, was a manly champion of the union of surgery and medicine. It was on Mederer's recommendation that the poor barber,

Joh. Hunczowsky (1752–1798) of Czech in Moravia,

was sent to Paris, London etc. to obtain his education, and then became a teacher in the Josephinum. He was a good operator, and died from the effects of an injury received in an operation. Another surgeon who began his activity in the Josephinum was

Baron Jos. Jac. von Mohrenheim (died 1798),

who became finally ordinary physician of Catherine II. and obstetrician to the Grand Duchess. He was also an important surgical practitioner as well as an oculist. An army-surgeon and professor, chief of the city hospital, was

Ferdinand Leber (1727–1801), the son of a wig-maker of Vienna.

He anticipated Guattani in the practice of indirect compression of aneurisms, and became immortalized in the annals of the humanitarian contests of the 18th century by his successful struggle against the torture — he was a "Torturarzt". He, and the professor of jurisprudence Sonnenfels, succeeded in getting rid of the torture in Austria in 1776.

Jos. Jac. Plenck (1732–1808) and
Jacob von Reinlein (1744–1816),
until 1787 professor in the surgical school, also belong here.

Carl Caspar von Siebold (1736–1807)
(the first important representative of a name often distinguished in medical science), as the founder of an institution for surgical instruction, where, for the first time in Germany, surgery was actually taught clinically or policlinically, was an eminent promoter of this science, particularly in South Germany and from Würzburg as a center.

The son of a surgeon of Nidecken in the duchy of Juliers, he for some time assisted his father, notwithstanding he had already completed his higher studies. Then he went into the field-service of France, during which he came to Würzburg and here abandoned military service in order to go to France, England and Holland at the expense of the prince-bishop. After his return he was appointed physician-in-ordinary and adjunct to a professorial chair, and subsequently professor of anatomy, surgery and obstetrics. In this position he was one of the most famous professors in Germany, and even received tokens of recognition from France, doubtless because he was the first in Germany to perform (1778) the operation of symphyseotomy.

Adam Friedrich Vogel (1746–1785),
a physician of Lübeck,[1] deserves to be mentioned here as an exception among the physicians of that day, since he did not scorn surgery. Justus Arneman (1763–1807), the author of a "System der Chirurgie", and Bernhard Christoph Faust (1755–1842) of Bückeburg, the inventor of the useful leg-swing (Beinschwebe), are also to be mentioned. The latter was a warm-hearted and warm-blooded enthusiast, influenced too by honorable motives, who pressed forward with his reform proposals even to the French National Assembly.

The greatest German surgeon of the 18th century, at once an eminent surgical writer and an excellent physician, after the style of many English surgeons, the man whom even Dieffenbach chose as his model, was

August Gottlieb Richter (1742–1812), of Zörbig in Meissnischen, where his father was a minister. Richter was the descendant of a family of ministers and professors, and became finally himself a professor in Gottingen. He wrote, among other works, a famous book on hernia, which was translated into several languages, published a surgical "Bibliothek", wrote the surgical text-book "Anfangsgründe der Wundarzneikunst" etc. On the completion of the usual studies he had visited London, Paris, Leyden and Amsterdam, and in 1771 was made a professor. In this position he studied all parts of surgery and most of them he improved. In the dressing of wounds his principle was "geschwinde, gelinde und selten." In his son Georg August (1778–1832), professor in Konigsberg, Richter found an editor for many of his writings. Richter, like most of the surgeons above mentioned, devoted himself prominently to

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[1] Several other physicians and surgeons of this name are known, e. g. Zacharias (1708–1772) and his son Jac. Christian, likewise in Lübeck, and Benedict Christian, professor in Altdorf.

The same was true of

JOH. ERNST NEUBAUER (1738–1777), a professor in Jena.

JOH. ALBERT HEINRICH REIMARUS (1729–1814),

a practising physician and professor in Hamburg, and son of the Reimarus rendered famous by Lessing, was the first to employ belladonna as a mydriatic, and thus render a great service to humanity. The capable teacher and observer

JOSEPH BARTH (1745–1818) of Malta,

professor of anatomy and oculist of Joseph II. in Vienna, in 1773 was the first to give separate lectures on ophthalmology, and he also founded an ophthalmic hospital.

The practitioner Ant. Karl von Willburg of Nuremberg in 1785 was the first to perform reclination of cataract, and D. G. C. Conradi in Nordheim near Göttingen, the first who performed discision of the lens through the cornea, with the object of securing subsequent spontaneous resorption (1797). We know from Gœthe's autobiography that the eminent, though odd and pious, Jung-Stilling (1740–1817) enjoyed great reputation for a long period as an operative oculist or coucher of cataracts.

The following prominent oculists of the 18th century continued eminent in the 19th century also:

JOH. AD. SCHMIDT (1759–1809) of Aub, near Würzburg, a professor in Vienna, as competent an observer — he first described e. g. syphilitic iritis and also introduced this designation (Proksch) — as he was a capable teacher and writer;

CARL HIMLY (1772–1837) of Brunswick, a professor in that city, as well as in Jena and Göttingen. Both of these oculists were pupils of Barth and experimented with mydriatics. Schmidt was the first to employ the latter in iritis, while Himly used them extensively in operations. Both of them published an ophthalmological "Bibliothek".

Belonging to the 18th century in spirit, as well as in the decisive period of his life, was the famous oculist

GEORG JOS. BEER (1763–1821), a professor in Vienna, who extended what Barth and Schmidt had begun. It is upon his teachings that the fame of the university of Vienna in this specialty depends. In them too the ophthalmology of the new Vienna School took its origin. Beer made himself of essential service in the entire department of ophthalmology, where he was the first to make extensive use of pathological anatomy. It was, however, in the doctrine of inflammations, which he divided into idiopathic, those excited by local injuries, and sympathetic, those called forth by a general dyscrasia, that he performed the most eminent service. He also promoted greatly the judicious treatment of cataract, extraction, the formation of an artificial pupil (he first drew forth the iris and cut it off externally) and the improvement of instruments.

Pupils are the best evidence of the importance of a teacher, and Beer's pupils were Ph. von Walther, C. F. von Graefe, F. Jaeger, William Mackenzie, Quadri, Chelius, Reisinger etc.

Otology was advanced by Kritter and Lentin. The catheterization of the Eustachian tubes and perforation of the mastoid process were discussed and performed in Germany — the latter particularly by:

Justus Arneman (1763–1807) of Lüneberg,

who was for a long time professor in Göttingen, then a practising physician in Hamburg, where he shot himself.

Orthopaedia was especially cultivated by the Swiss J. Andr. Venel (1740–1791), a physician of Orbe, who treated club-foot, crooked joints etc., though only by the aid of apparatus; Joh. Christian Ehrmann in Frankfort (1749–1827), who died in Speyer, though born in Strassburg; Aug. Brückner (1769–1797) in Gotha etc. The first operative treatment of club-foot, which consisted in a wide, direct incision clear through the tendo Achillis, was undertaken by the Hessian physician Gerhardt Thilenius (1745–1809).

The cosmetic art of dentistry, an art then, as to some extent at the present day, the favorite field of charlatans, enjoyed much cultivation.

Friedrich Hirschfeld (also Hirsch, 1753–1820) of Sensheim in Franconia, court and university dentist at Göttingen, was, however, no charlatan. Joh. Jac. Jos. Serre wrote a "Geschichte oder Abhandlung der Zahnschmerzen des schönen Geschlechts in ihrer Schwangerschaft". Ph. Pfaff, royal Prussian dentist, A. A. Brunner, Carl A. Blumenthal, Joh. Friedr. Galette, who belonged to a family of dentists in Mayence, should also be mentioned.

e. The English,

even during the 18th century, manifested those characteristics, which distinguish their surgery so greatly at the present day — thorough study of anatomy and physiology, quiet, sober observation, careful, conscientious, and yet bold, conduct in operating, and careful after-treatment. In the beginning of the century

William Cheselden (1688–1752),

as important an anatomist as a surgeon and oculist, was active in London. He introduced the formation of an artificial pupil by a simple incision of the iris (iridotomy, 1728), made with a needle introduced through the sclera. He was a rapid operator, performing lithotomy in a few minutes. [Cheselden was born near Somerby in Leicestershire, studied under a surgeon in Leicester and subsequently under the anatomist Cowper and the surgeon Fern in St Thomas's Hospital, and began to deliver lectures at early as his 22d. year. He was principal surgeon to Queen Caroline, to whom he dedicated his magnificent "Osteology, or the Anatomy of the Bones" in 1733, surgeon to St. Thomas's and the Chelsea Hospitals, and a member of the French Académie de Chirurgie. His dexterity in the performance of lithotomy excited the wonder of his contemporaries, and stories are told of his performance of this operation in fifty-four seconds. Originally he was an advocate of the high operation, but his experience at a later period led him to prefer the lateral section. Like many great surgeons, Cheselden is said to have been exceedingly nervous and restless before commencing an operation, but as firm and steady as a statue during its actual performance. His "Anatomy of the Human Body" was published in 1713, and his "Treatise on the High Operation of the Stone" in 1723.] His pupil

SAMUEL SHARP (about 1700–1778) of London,

a bold operator, was equally meritorious in the operative treatment of diseases of the eyes Like Cheselden a member of the Académie de Chirurgie, and surgeon of Guy's Hospital, Sharp was eminent in almost every department of surgical art. He wrote a "Treatise on the operations of surgery" (1739), and a "Critical inquiry into the present state of surgery" (1750), in which latter work he called the attention of his English colleagues to the advances made by the French in the science and art of surgery.

ALEXANDER MONRO SR. (1697–1767) of Edinburgh

was a professor of anatomy and surgery, and eminent in both branches. He probably contributed more than any single individual to the success and reputation of the medical school of Edinburgh. His "Osteology, or a Treatise on the Anatomy of the Bones" appeared in 1726, and his "Essay on Comparative Anatomy" in 1744. His sons Alexander (1733–1817) and Donald (1729–1792) and grandson Alexander (tertius, 1773–1859), were likewise eminent surgeons. Other bold operators were Benjamin Gooch (died about 1780); James Hill, a surgeon of Dumfries ("Cases in Surgery", Edinburgh, 1772), and particularly

CHARLES WHITE,

a surgeon of Manchester, and the first representative of conservative surgery, who in 1768 performed the first resection of the humerus, leaving the periosteum, so that complete regeneration of the bone took place. He believed he had removed the head of the humerus, but as a matter of fact this was first done in 1774 by James Bent of Newcastle. White also performed upon the cadaver resection of the hip-joint, but the operation was first performed upon the living subject by Anthony White in 1821. Charles White also taught the reduction of dislocations of the shoulder with the heel in the axilla (a method ordinarily ascribed to Sir Astley Cooper), and removal of the edges of the bones in pseudarthrosis. ["Cases in Surgery with Remarks" London, 1770. As the excision of joints is a peculiarly English operation, it may be well to give its history rather more completely. According to Erichsen, the elbow-joint was exsected in a compound dislocation as far back as 1758 by Wainman of Shripton. He was followed by Chas. White (shoulder-joint) in 1768, Bent of Newcastle (1774), Orred, Filkin of Northwich (knee-joint, 1762) and John O. Justamond of London (elbow) in 1775. The attention of surgeons, however, was not prominently directed to the new operation until the publication by Henry Park, a surgeon of Liverpool, of his "Account of a new method of treating diseases of the knee and elbow, in a letter to Mr. Pott" (London, 1782). Even now the merits of the operation gained recognition slowly, and in fact it had been almost forgotten until revived in the present century by Liston and Syme. H.]

A very important cultivator and promoter of surgery (malum Pottii) was

PERCIVAL POTT (1713–1788) of London,

surgeon to St. Bartholomew's Hospital from 1749 to 1787. Dieffenbach called him the model for surgical writers. [Pott's services were specially eminent in the study of hernia, spinal disease and chronic diseases of the joints in general, fistula lachrymalis, fistula in ano and injuries of the skull. His complete "Chirurgical works" appeared at London in 1771.] No less may be said of

WILLIAM BROMFIELD (1712–1792) of London,

surgeon and founder of the Lock Hospital, and surgeon to St. George's Hospital (Aneurisms; Bromfield's tenaculum — tenacula for use in ligation were known as early as Bruno of Longoburgo!). Disarticulation at the shoulder joint. [Bromfield's "Chirurgical observations and cases" were published in 1773.]

Edward Alanson (1747–1823) of Liverpool

was the inventor of the conically excavated circular amputation.

George Arnaud (de Ronsil, died 1774),

who fled from France to England, distinguished himself there as a surgeon, and particularly as regards hernia and aneurisms. Daniel Turner wrote "The Art of Surgery", 1722, with treatises on skin-diseases and venereal disease.

William Hunter (1718–1783) of Long Calderwood, Scotland,

originally a student of theology, was highly famed as a surgeon, obstetrician and anatomist. A pupil of Cullen, he went to London in 1741, began to lecture on anatomy and surgery in 1746, and soon acquired a wide reputation. After 1749 he devoted himself chiefly to obstetrics, and in 1764 was appointed physician to the queen. His success in practice may be judged from the fact that he expended £100,000 upon his house, his library, his collection of normal and pathological anatomy etc. The latter now forms the Hunterian Museum of the University of Glasgow. — In aneurism Hunter tied the trunk of the artery above the sack (Hunterian method). His chief works were the "Medical Commentaries", 1762–64, and the magnificent "Anatomia Humani Uteri Gravidi", which appeared in 1774, and embodied the labor of twenty years. — His younger brother

John Hunter (1728–1793) of London,

originally a ship-carpenter, enjoyed and deserved, if possible, still greater reputation. A student of his brother William, Cheselden and Pott, he began the practice of surgery in London in 1763, became surgeon to St. George's Hospital in 1768, surgeon extraordinary to the king in 1776 and surgeon-general of the English forces in 1790. He was especially eminent as a pathological and comparative anatomist and an investigator of the subject of inflammation and the blood (experimental pathology). As a student of syphilis he made experiments (on himself?) in syphilitic inoculation, described the Hunterian chancre and introduced the expression "constitutional syphilis", but did not observe "visceral syphilis" (Proksch). He was an advocate of the unity of syphilis and the gonorrhœal poison. Hunter was the first to describe phlebitis, the muscular layer of the iris, made the discovery that the white blood-corpuscles precede the red etc. etc. He also devoted attention to botany, mineralogy and zoology (circulation of insects), and did not scorn even the subject of dentistry. He attained to great wealth, and his anatomical collection, consisting of 10,000 preparations, was purchased by the government for £15,000, presented to the College of Surgeons, and forms the chief part of the Hunterian Museum in London. Hunter was an advocate of "healing under a scab". His chief works were "Natural History of the Human Teeth" (1771–78); "On Venereal Disease" (1786) and "On the Blood, Inflammation and Gunshot Wounds" (1794). — An equally famous surgeon was

Benjamin Bell (died 1806) of Edinburgh,

who rendered eminent service to the subject of the treatment of ulcers and white swellings of the joints and fractures and dislocations, the favorite field of English surgeons. Bell employed tubes of lead and silver for purposes of drainage. His "System of Surgery", 6 vols., appeared at Edinburgh, 1783–87, and the "Treatise on Gonorrhœa Virulenta and Lues Venerea" in 1793.

John Bell (1763–1820) of Edinburgh,

the elder brother of Sir Charles Bell, was likewise an eminent surgeon of the 18th century. He was a professor of anatomy, surgery and obstetrics and a busy practitioner in Edinburgh, and likewise a fertile writer. His "System of the Anatomy of the Human Body" appeared in London 1793–98, and his "Principles of Surgery", 1801–07. John Bell was an excellent classical scholar, and one of the most skilful operators of his day.

Thomas Kirkland (1721–1798) of Ashby in Leicestershire studied in an excellent way the subject of fractures, gangrene, hæmorrhages, childbed fevers etc. Henry Park (1744–1831) of Liverpool, a student of Bromfield, Pott and Le Cat, performed in 1781 the first resection in war. A good syphilographer, like most of the English surgeons of that day, was Thomas Bayford, who distinguished the contagium of gonorrhœa from that of syphilis, and found simple injections, without mercury, sufficient to cure the former disease. John Abernethy (1764–1831) of London was a very eminent anatomist, physiologist and surgeon, who maintained especially the propriety of the internal treatment of surgical lesions. [He was surgeon of St. Bartholomew's Hospital, and professor of anatomy and surgery in the Royal College of Surgeons, as well as a fertile author on numerous anatomical, surgical and pathological subjects. His eccentricities of manner, well known to the profession, covered a kind and generous heart, though they have given him the reputation of rudeness and brutality.]—Henry Cline (1750–1827), a famous surgeon of St. Thomas's Hospital, was the teacher and predecessor of Sir Astley Cooper. Sir James Earle (1755–1817), a relative and pupil of Pott, [surgeon extraordinary to the king, dean of the surgeons of St. Bartholomew's and director of the College of Surgeons,] was the inventor of injections (red wine) in hydrocele ("Treatise of Hydrocele", London, 1791). James Moore of London, director of the National Vaccination Institute, was an advocate of the process of healing under a scab (a method already known to Falloppio), and sought by compression of the nervous trunks to diminish the pain in surgical operations. William Hey of Leeds (1736–1819), a pupil of Bromfield and Donald Monro, discussed resection and disarticulation, and Kerr of Northampton amputation at the hip-joint. [The brothers James (1675–1742) and John (died 1759) Douglas deserve mention, the former particularly as an anatomist, and the latter as a lithotomist of reputation.]

The American Richard Bayley (1745–1801) of New York, a pupil of John Hunter, should also be noticed. [He performed in 1782 a successful disarticulation at the shoulder joint, and in 1797 published his "Essay on the Yellow Fever".]

[To whom we may add:

John Belchier (1706–1785) of London, a pupil of Cheselden, surgeon of Guy's Hospital and a Director of St. Thomas's Hospital, and one of the first (1735) to study the subject of the nutrition of bones by the method of mixing madder with the food of the animals under investigation.

Sir William Blizard (1743–1835), a pupil of Pott and the Hunters, surgeon to the Magdalen and London Hospitals and the first surgeon to tie the superior thyroid artery for the relief of goitre and one of the first to pass a ligature about the subclavian. In connexion with the anatomist Maclaurin too he founded in 1785 the London Hospital Medical School, the first school united with a large hospital in London.

Joseph Warner (1717–1801), a native of Antigua, pupil of Sharp and the successor of his master in Guy's Hospital (1745), a position which he continued to hold for forty years. In 1775 Warner undertook for the first time the ligation of the common carotid artery.

Sir Charles Blicke (died 1815), the successor of Pott in St. Bartholomew's Hospital in 1787, master of Abernethy and an eminent and successful surgeon.

James Rae (1716–1791), the first teacher of clinical surgery in Edinburgh; John Aitken (died 1790), professor of midwifery, anatomy, surgery, medicine and pharmaceutic chemistry in Edinburgh, and the inventor of the chain-saw; Thomas Baynton of Bristol (Baynton's dressing for ulcers, 1797); Bryan Crowther (1765-1840) and Edward Ford, who studied the subject of white swellings of the joints; Bradford Wilmer of Coventry, who wrote on the subject of hernia (1788) and Thomas Sheldrake (about 1795), a skilful orthopaedic surgeon, also deserve mention. (H.)]

The following physicians besides Cheselden were distinguished as oculists:

William Rowley, professor in Oxford (1743-1806), who employed electricity in amaurosis, but without success; James Ware (1756-1815) of London, who described ophthalmia neonatorum, a disease already recognized as specific by Joseph Warner (1717-1801), chief surgeon of Guy's Hospital; Benedict Duddell, a pupil of Woolhouse (see page 519), who wrote a "Treatise on the diseases of the horny coat and the various kinds of cataracts", London, 1729. [Wm. Coward (born 1656, Ophthalmiatria, 1706); Peter Kennedy (Ophthalmographia, 1713); Henry Pemberton (1694-1771), an Iatro-mathematician and student of physiological optics, who wrote on accomodation in 1719; James Jurin, who has been already mentioned, also discussed the subject of accommodation; Sylvester O'Halloran (1728-1807) of Limerick; Thos. Gataker (died 1769), surgeon of St. George's Hospital in London, who wrote on the anatomy of the eye in 1761; Geo. Chandler (cataract, 1765); Geo. Borthwick, a surgeon of Kilkenny (cataract, 1775). Geo. Wallis (1740-1802, Nosologia methodica oculorum etc, 1785); Jonathan Wathen, a surgeon who discussed fistula lachrymalis and cataract, and recommended nasal injections in catarrhal deafness (1755); Chas. Wm. Wells (1757-1817), a native of Charleston, S. C., practising, however, chiefly in London, wrote "An essay on single vision with two eyes, together with experiments and observations on several other subjects in optics" (London, 1792), and is said by Sir Benjamin Brodie to have been a remarkable man. The great English chemist and physicist John Dalton (1766-1844), author of the atomic theory etc., deserves mention here for his service in directing the attention of surgeons to the subject of color-blindness (Daltonism) in 1798.—The kindred subjects of optics and microscopy were also studied by Henry Baker (died 1774), the abbé John Tuberville Needham (1713-1781) and George Adams (1750-1795) an eminent optician of London. H.] Almost all the English surgeons mentioned above also devoted attention to ophthalmology, as well as to dentistry. The latter subject was studied especially by Thomas Berdmore.

f. The Dutch

enjoyed in this century eminent surgeons, who officiated also as obstetricians and anatomists. At the head of these was

PIETER CAMPER (1722-1789),

who, in order to acquire manual dexterity in his branch, had learned to use the lathe, to make joiner-work and to paint. It was probably due to these manual occupations that he did not scorn to turn his attention to the best form of shoes[1] (it is frequently advantageous for the practitioner to know where the shoe pinches), as well as to the remedies for corns, to trusses etc. The Frenchman Nic. Leguin was the first to employ elastic springs of steel in the manufacture of trusses (1663), and the double truss was brought forward by Tipharie in 1761. Camper was a very fruitful author, and rendered good service in the doctrine of congenital hernia, the introduction of

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1. Camper's treatise "Ueber die beste Form der Schuhe", Vienna, 1782, was translated and republished as something new in England in 1861 and 1871, and I think I have seen it also published as an advertisement by some of our metropolitan shoe dealers in this country. (H.)

vaccination, the improvement of the nutrition of children etc. He was successively professor in Franeker, Amsterdam and Gröningen, and proposed the operation of symphyseotomy. — After him

Andreas Bonn (1738–1818)

was professor in Amsterdam.

Eduard Sandifort in Leyden

was a very important surgeon, discussing dislocations, herniæ etc., and furnishing the first observation of a dislocation of the femur downwards.

David von Gesscher (died 1810) wrote an historical work on the surgery of Hippocrates; Jac. van der Haar (1717–1799) often cured tumor albus by daily poulticing — literally "Aufschlagen" — the knee with wet towels, and discovered echinococci as the cause of fractures, though the latter discovery was also made by van Wy in Amsterdam; Gerhard ten Haaff (1720–1791) zealously defended the extraction of cataract and cured cut-off noses, injected the Eustachian tubes etc.; Adrian van Pappendorp discussed congenital closure of the anus, and J. Piet. Rathlauw[1] wrote on cataract, 1752. — Among the

g. Danes

we should notice

Simon Krüger and his son;

Georg Heuermann (died 1768),

an operative surgeon and oculist, who examined more closely the indications for depression and extraction of cataract, and also proposed to remove the lens after incision by means of a kind of corkscrew. He performed iridotomy in 1756 by a puncture through the cornea, and observed a hernia of the foramen ovale in 1754.

Heinrich Callisen (1740–1824),

professor of surgery in Copenhagen, a learned and able operative surgeon and fruitful author, recommended too strongly the perforation of the mastoid process, and e. g. with Alexander Koelpin performed the operation on the famous Dr. Berger for tinnitus aurium. Dr. Berger died of inflammation of the brain, induced by the use of irritating injections into the wound in order to clear the Eustachian tube.

Joh. Clemens Tode (1736–1805),

who, like Callisen, had been a barber, and after studying in England was made a professor and court physician, defended energetically the distinction between the gonorrhœal and venereal poisons. However Francis Balfour in 1767 had conjectured that the two contagia were different, Charles Hales had expressly emphasized this fact, and William Ellis (died 1785) had proved it (even before Hunter) by experiments in inoculation (Proksch). In

h. Sweden

Olof af Acrel,[2] the "Desault of the North" and the father of Swedish surgery, distinguished himself as the most important surgeon of the North.

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1. Rathlauw was forbidden to practise midwifery by the College of Physicians in Amsterdam because he refused to purchase the so-called secret of Roonhuysen. He claimed, however, to have himself discovered the secret — a fenestrated instrument with an imperfect lock which he described in 1754. (H.)

2. Compare "Olof af Acrel, the Father of Swedish Surgery", by Prof. Otto E. A. Hjelt in Helsingfors, 1884. Through the kindness of the author, the first professor of pathological anatomy at Helsingfors (from 1859–1883), the following

He was educated in Göttingen, Strassburg and the Académie de Chirurgie of Paris, and was familiar with the literature of foreign countries. He introduced into Sweden the clinical method of instruction in surgery. His chief work was entitled "Chirurgiska händelser", "Surgical Cases", and appeared at Stockholm in 1759. Acrel united physiology and anatomy with surgery, and the latter with forensic medicine, limited the practice of amputation and inclined to conservative surgery, emphasized the value of hygiene in the treatment of wounds etc.— The Swedish royal physician

Joh. Gust. Wahlborn

maintained a constant literary war with Acrel.

Pehr Pierchen (cancer) and

Joh. Lorenz Odhelius (died 1816),

an oculist and professor of medicine in Stockholm, were also eminent physicians.

[**Joh. Gustav Acrel** (1741–1801),

the nephew and pupil of Olof Acrel, was professor of practical medicine in the university of Upsala and a skilful practitioner. (H.)] — Among the

i. Russians

surgery was imported by foreigners, and Germans or Russo-Germans were its chief representatives. Among these we may notice Joh. Mart. Minderer, Christoph El. H. Knackstedt (1749–1799), Mohrenheim and others.

5. MIDWIFERY.

The 18th century was almost more eventful in midwifery than in surgery. From the latter branch during this century, and particularly in its latter half, obstetrics began to be separated too almost completely and generally — less in practice, however, than in theory. From numerous and careful observations of the normal process of labor made by men of scientific education, it won perfectly secure ground, and accordingly founded the indications for the choice between "Nature" and instrumental and manual aids. The latter undoubtedly continued to be generally overestimated in comparison with the powers of nature. After the how and when, the circumstances, time, the object and possibility of rendering assistance were once established, physicians were able to invent suitable mechanical aids in accordance with a preconceived plan, or to alter those already invented, often to improve and devise the most appropriate methods for their employment. To these benefits midwifery proved herself specially

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works from his pen are before me: "Karl von Linné as a physician" etc., Leipzig, 1882; "Karl von Linné and his relations to Albrecht von Haller" (Swedish), Helsingfors, 1878; "Summary of 1000 autopsies" (Swedish), Helsingfors, 1872; "Medical relations in Abo about 1750", Helsingfors, 1882; "The Institute of Pathological Anatomy in the university of Finland 1859–1871" (Swedish), 1871; "The question of public hygiene in Finland" (Swedish), 1879; "The Institute for Pathological Anatomy in Helsingfors, 1871–1883" (Swedish), 1884; "Sanitary laws of Finland, proposals and motives" (Swedish), part I. 1873, part II. 1875; "The diffusion of venereal diseases in Finland" (German), Berlin, 1874; "Address at the dedication of the laboratory of pathological anatomy" (s. a.), French.

accessible, and for them she, like surgery her mother, showed herself grateful. For a Palfyn obtained almost at once the applause of all, while the derision, scorn and misrepresentation of the learned physicians befell e. g. an Auenbrugger, as they did in some degree also the later Jenner.

The most beneficent, because the most effective and bloodless of inventions, that of the forceps, required to be made again in the 18th century, though the new inventor may have received from his predecessors the special suggestion thereto. This re-discoverer of the forceps was

JOHANN PALFYN (1649–1730),

who in 1721 exhibited to the Academie in Paris his instrument consisting of two deeply concave, spoon-like, non-fenestrated and separate blades. This instrument did not meet with much approval. Subsequently he added a third blade in order to grasp the head more firmly. The earliest publication of this "Palfyn's hand", as it was called, was made by Heister in 1724.[1] This imperfect instrument was improved by Dusé (who crossed the arms) and particularly by the two Grégoires, the elder of whom had also in 1720 founded in the Hôtel-Dieu the first obstetric clinic for physicians. They added to their forceps a kind of lock, and above all fenestrated blades, and under this form they were described in Germany in 1746 by the Leipzig professor Phil. Ad. Böhmer (1717–1789), who had seen them in the hands of the Grégoires and gave them the name "Zange" (forceps). The instrument was greatly improved by the elder Fried in Strassburg, and above all by Levret, who employed long, fenestrated forceps, with a revolving pin for a lock, a pelvic curve and roughened handles, and by Smellie, whose forceps were short, short-handled, with a marked cephalic curve, a so-called English lock and blades covered with leather. — The elder Stein was especially active in disseminating the forceps throughout Germany. — Numerous modifications — up to the present day about 200 — were of course gradually made by every important obstetrician, but, on the whole, the form of Levret was preserved in France, that of Smellie in England, and in Germany that of Naegele, with the so-called German lock.

Midwifery hooks were also often improved upon, e. g. by Smellie and Levret. During the 18th century,

a. The French

undoubtedly took the first place in obstetrics also, the natural result of their possessing the first institutions for instruction in this art. The oldest among the important French obstetricians was Jean Astruc (1684–1766) who, like most of the surgeons already mentioned, devoted attention likewise to obstetrics, though only toward the close of his life.

How versatile this physician (who will also require notice under other sections) was, may be judged from the fact that he introduced in 1753 even into Biblical investigation a new epoch by demonstrating that the books of Genesis must have been drawn up after two manuscripts, of which the one always speaks of Jehovah, the other of Elohim only. Astruc's "Traité des maladies des femmes" appeared at Paris 1761–1765.

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[1] The French called the instrument "Tire-tête", "Les mains de Palfyn" or "Les tenettes de Palfyn". This instrument was afterwards claimed as his own by Le Doux, a surgeon of Ypres. Palfyn's forceps were not known in England until 1733, when they were mentioned by Butler (or Butter) in the Edinburgh Medical Essays and Observations. At this time Chapman had been using the midwifery forceps for more than ten years. See page 522 n. 4. (H.)

Nicolas de Puzos (1686–1753) of Paris was the instructor of midwives in the Académie de Chirurgie and a pupil of Clément. He therefore specially emphasizes podalic version, but does not overlook the forceps also, and is the first among modern obstetricians to recommend perineal support and combined external and internal examination, friction of the os uteri as a preliminary measure in labor etc. Puzos also improved the teachings regarding the pelvis, particularly the deformed pelvis. His "Traité des accouchements" etc. was published posthumously in 1759. The same was done too by

Jacques Mesnard, a surgeon of Rouen, who was the first of the French to direct attention to the forceps in a book. The obstetric position was still upon the back with the feet drawn up against the buttocks. Mesnard's "Le guide des accouchements" etc. appeared in 1743. Indisputably the most important French obstetrician of the 18th century, however, was

André Levret (1703–1780) of Paris. Among other things he improved the teachings as to the operation of version and determined definitely its indications, warns particularly against forcible pressing of the child upwards, regarded foot presentation as an indication for extraction, and taught a better method for the accomplishment of the latter, converted presentation of the buttocks into that of the feet, or applied the forceps, rendered good service in his teachings regarding the Cæsarean section, recommended in placenta prævia separation of the edge of the placenta rather than penetrating through it etc., affirmed too the existence of the *culbute* (recently again half-honored, so far as relates to the early months of pregnancy), and devised Levret's forceps, perforator and pince à faux germes. Levret had pupils from all countries. His "Traité sur l' art des accouchements" etc. was published at Paris in 1753. The versatile and unprejudiced

Antoine Petit (1718–1794), likewise of Paris, unprejudiced, because, although a physician, he did not despise surgery and midwifery (a very exceptional matter in that time), and Pean must be counted among the eminent teachers of midwifery in Paris. Petit's "Traité des maladies des femmes enceintes" etc. appeared after the death of the author in 1800. Pean flourished about the middle of the 18th century, but appears to have left no writings. The second among the obstetricians of that day was

François Ange Deleurye (born 1737), a teacher at Paris, who rendered special service to the doctrine of version, which he taught should be performed immediately after rupture of the membranes before the escape of the waters. He likewise divides the doctrine of extraction from that of podalic version, and remarks that the former operation need not necessarily always follow the latter. In Cæsarean section he advises the incision to be made in the linea alba, because here no vessels are injured. Traité des accouchements, Paris 1770. — Reliance upon the aid of nature in parturition found an eminent advocate in the famous

Fr. L. J. Solayrès de Renhac (died 1772) (a pupil of the Parisian practitioner Pean), who died young of tuberculosis. He discussed excellently the mechanism of labor, especially in presentations of the head. His "Dissertatio de partu viribus maternis absoluto" appeared in 1771, and marked an epoch in the history of the obstetric art. In this work he reckons presentations of the feet, buttocks, face and knees among those which need not necessarily be terminated artificially, a doctrine which was contested down to the time of Boër.

In conjunction with the physician next mentioned, and following in the footsteps of Smellie (1752), he put the finishing stroke to the doctrine of the culbute. His pupil

Jean Louis Baudelocque, Sr., (1746–1810),

who rendered eminent service in his teachings regarding the pelvis, and invented an external pelvimeter, based his own views upon those of his master. Baudelocque was an opponent of the artificial induction of premature labor, and still more of symphyseotomy. He admitted only — 96 positions of the fœtus. L' art des accouchements, Paris, 1781.

Jean François Sacombe (died 1822),

like Solayrès de Renhac a pupil of Jean Serre a professor in Montpellier, was a mortal enemy of Baudelocque and involved the latter in a notorious medical scandal suit. Sacombe was a fanatic in his defence of the powers of nature and discarded *all* operations. He desired to have all midwifery entrusted simply to physicians and midwives, and founded an "Anti-Cæsarean-section School". From a medical fanatic he became, as often a happens, a subsequent charlatan, and even went so far as to affirm that he would rise upon the earth again after his death. — The operation of Symphyseotomy, first recommended in 1768 by

Jean René Sigault of Paris,

approved by Camper and actually performed upon Madame Souchot by Sigault with the assistance of Alphonse Leroy (1742–1816) in 1777, excited great attention and long disputes regarding the grounds for and against its performance. The operation was directed against Cæsarean section. This first operation terminated, indeed, in vesical fistula and prolapse of the vagina and uterus, but a living child was born, and the operation then found a few imitators in all countries. Among these were C. C. von Siebold, Mursinna, Fr. Max Fr. von Ritgen, the last time (provisionally — for everything recurs again in medicine!) in 1820. To-day, however, the operation is entirely abandoned, having been practised about 57 times, with the preservation of 38 mothers and 31 children. The defense of Cæsarean section in opposition to Symphyseotomy was undertaken among others by

Théodore Étienne Lauverjat (died 1800),

who also brought forward a new incision for the former operation, an oblique incision on the side toward which the uterus most inclined. Pierre Victor Coutouly in 1788 introduced a kind of cephalotribe.

Jacques André Millot (1738–1811)

was an independent observer. Jean Bruhier d'Ablaincourt (i. e. of Ablaincourt) translated Deventer's treatise on obstetric operations, and thus falsely acquired the reputation of a promoter of the doctrine of the pelvic inclination and pelvic axis. Pierre Roussel (1742-1802) awakened a special literature by his book entitled "Système physique et moral de la femme". Most of

b. The Italians

were educated in the French doctrines and often under French teachers (particularly Levret), and they accordingly, in most respects, followed the footsteps of their masters. German midwifery also gained some influence in Italy. We should notice: Gius. Vespa, Domenico Ferraro, and especially Paolo Assalini, chief physician of the Italian army, who was with Napoleon in Egypt. The latter was a pupil of Baudelocque, and invented an instrument for compression of the head, a sort of cephalotribe, an extractor of the head and a trepan-perforator.

Text-books were written also by Nannoni in Naples; Nessi in Pavia; Horatio Valota; P. Urb. Galeotti in Naples, a pupil of Nannoni; Francesco Asdrubali in Rome; Piccolo in Verona; Antonio Galli in Bologna; Cattani and Nerozzi of the same place; Luigi Calza in Padua, the earliest (1769) special professor of obstetrics in Italy, and Franc. Valle in Florence, the latter of whom was a specially eminent representative of the French school. German midwifery was created in Italy by Galeotti's translation of Roederer's book, and by Monteggia's translation of the works of Stein.—Maria della Donne and Anna Morandi Manzolini (1716–1774) distinguished themselves as practical and scientific female obstetricians.

c. The Spaniards

obtained obstetrical text-books through V. Vidart and J. de Navas in Madrid. Among the

d. Germans,

with whom in the beginning of the century scientific midwifery occupied a very low position,[1] we may by anticipation reckon the obstetricians who displayed their activity in Strassburg, a city which at that time proved itself in midwifery, as at an earlier period in surgery, one of the most excellent and earliest introducers of foreign science into Germany. These were:

Joh. Jac. Fried (1689–1769), the father, and his assistant and teacher of midwives J. G. Scheid, who translated la Motte's work into German in 1732; Fried's successors Josias Weigen (died 1773) and G. Albr. Fried (died 1773) the son, as well as Joh. Friedr. Ehrmann (1739–1794), son of the Strassburg clinician rendered famous by Goethe, Joh. Christ Ehrmann (1710–1790). These taught in the city (not university) lying-in hospital, which furnished 80–120 births per year, and to which men were admitted. At all events the influence of their educational activity extended chiefly over Germany. So too

Joh. Ehrenfried Thebesius (1717–1758),

a pupil of the elder Fried and a native of Hirschberg in Silesia, wrote an obstetrical text-book. He was the son of Adam Christ. Thebesius, the discoverer in 1708 of the so-called foramina Thebesii of the heart. Another pupil of Fried, far surpassing Thebesius in importance and influence, was the ingenious

Joh. Georg Röderer (1726–1763) of Strassburg,

who was called, at the instance of Haller, to Gottingen (1751) as the first German professor of midwifery, and erected there the first nursery of scientific obstetricians in Germany. He founded the science of obstetrics upon the basis of anatomy and physiology, banished the medical and exaggerated instrumental midwifery of his day, and aided manual midwifery to assume its proper position (Rohlfs). The doctrine of the pelvic axis in elucidation of the inclination of the pelvis, and the determination of the latter, depends upon Joh. Jac Müller — Basel, 1745 — who was the first to determine the inclination of the superior opening. — From the school of Roderer proceeded the anatomist and skilful obstetrician H. A. Wrisberg, Roderer's successor; J. S. Chr. Sommer (1740-1802) in Brunswick (pelvic axis, a doctrine which, however, he did not advance; pregnancy without preceding menstruation), and the Marburg professor

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[1] Joh. Andreas Deisch of Augsburg, a pupil of Fried, e. g. employed sharp instruments 29 times in 61 births during a single year. Joh. Dan. Mittelhaeuser in Weissenfels, however, "began to cut and slash" as soon as everything was not precisely normal. In this way he had a death-rate of only (!) 20 per cent. It was still the custom, both during pregnancy and after labor, to perform venesection, and this was particularly the case in puerperal fever.

GEORG WILHELM STEIN, SR., (1737-1803) of Cassel,

who marks an epoch in the field of German midwifery, though, on the whole, he remained true to the French school. He had been educated under Levret and diffused the teachings of his master in his home. Stein was particularly active in determining carefully the dimensions of the pelvis in the living female, in order to base thereupon the indications for operative interference. He invented in 1772 the first German pelvimeter, an instrument for measuring the inclination of the pelvis, and gave the first thorough description of the malacosteon pelvis. He improved the teachings regarding version and particularly the employment of the forceps and Cæsarean section, and brought forward instruments for rupturing the membranes (a finger-ring), a perforator, baby-scale etc. Many of his teachings are still held in honor.

Besides Heister, Schaarschmidt, Kaltschmidt and Böhmer in Göttingen, the surgeons and obstetricians of Berlin promoted the advancement of midwifery in Germany, though in a less degree than those already mentioned, who began their activity contemporaneously with Röderer. Among these Berlin surgeons we may mention

JOH. FRIEDR. MECKEL (1714-1774),

who, at the instance of Eller, was nominated (1751) teacher to the school for midwives in the Charité. He was followed by Joach Fried. Henckel, a pupil of Grégoire and Roderer in midwifery, who was the first in Germany to advocate incision of the linea alba in Cæsarean section. Henckel was followed by

JOH. PHIL. HAGEN (1734-1795) of Tuntzenhausen near Weissensee,

a self-educated man who had worked his way up from the deepest poverty. Originally a company surgeon, he came to be surgeon-councillor and professor. To the very end of his life his Berlin colleagues omitted no opportunity of twitting him upon his humble origin. He recommended the forceps of Levret, as did also

HEINRICH NEPOMUCK VON CRANTZ (1722-1797) of Luxemburg,

a pupil of van Swieten and the inaugurator (1754) of a new school of midwifery in Vienna. Von Crantz had been educated as an obstetrician in England and France, and was a very popular teacher, chiefly of midwives, but also of medical students, who were permitted to share in his instruction. He was an advocate of natural midwifery and the forceps, and discarded all manipulations, cutting instruments etc. His successor was

VAL. FERD. LEBMACHER (died 1797),

who took Crantz's position after the latter in 1760(?) had been chosen professor of the theory of medicine in place of Melchior Stoerck. Besides these

RAPHAEL STEIDELE (1737-1821) of Innsbruck,

the predecessor of Boër, professor of theoretical midwifery from 1797, and

ANT. JOH. RECHBERGER, teacher of the actual royal and imperial surgeon-in-ordinary

SIMON ZELLER, a noble of Zellerberg,

were likewise teachers in this department. The latter, like all the Vienna obstetricians mentioned, rendered good service in the determination of the natural termination of labor — especially in face presentations. He also endeavored to prove by experiments upon rabbits that syphilis took its origin from polyandria (Proksch).

Joh. Melitsch (died 1811),
a pupil of Stark, taught from 1793 in the lying-in hospital founded in Prague in 1789. The earlier

Stephan Weszpremi (born 1723),
a versatile and famous physician of Debreczin in Hungary, should also be mentioned here as an obstetrician, in connexion with the Austrians already noticed. In Jena

Joh. Christ. Stark, Sr., (1753–1811)
was an important obstetrician, well known for his invention of instruments (placental spoon, a ring-knife for dismemberment of the fœtus, special forceps, pelvimeter etc.), the practice of Cæsarean section, and for his publication of an "Archiv für Geburtshilfe, Frauenzimmer- und neugeborener Kinderkrankheiten." An eminent obstetrician of Marburg was

Joh. Dav. Busch (born 1755),
who survived into the 19th century.

J. C. Gehler (1732–1796) of Leipzig, Joh. Melchior Aepli in Diessenhofen on the Rhine, Jodocus Ehrhart (1766–1827) and Ludw. Ad. Appun, rendered good service in the discussion of the removal of the placenta, that is its expulsion by the natural forces. Up to this period the placenta had been removed immediately, without even waiting to tie the cord. Chr. Jac. Seyler (under the presidency of G. P. Schaeber) refuted the doctrine which had remained in vogue from the time of the Ancients down to that day, viz. that in placenta prævia the placenta fell down before the commencement of labor (De placentæ uterinæ morbis", 1709), and Paul Scheel in 1799 first brought forward puncture of the membranes as a means for the artificial induction of premature labor in contractions of the pelvis etc. To-day this operation is a popular means of procuring abortion!

e. The English

did, indeed, likewise receive an impulse from France, yet they built up their midwifery, free from the actual tutelage of French doctrines, much more independently than was the case with the Germans in the 18th century. They exercised too, particularly towards the close of the century, a great influence upon Germany.

Indisputably the most important English obstetrician of this epoch was
William Smellie (1680–1763) of London.
He advanced our knowledge of the position of the head during labor and that of the contracted pelvis (besides the rachitic pelvis already known, he was acquainted with the malacosteon pelvis and the generally contracted pelvis), was the first to estimate the conjugata vera from the conjugata diagonalis, pointed out successfully once more the operation of cephalic version as well as version by the breech, although he ordinarily converted breech presentations into footling and then extracted, or in breech presentations extracted with blunt hooks. Smellie invented numerous instruments, including a forceps with a so-called English lock, which is used almost exclusively in England down to the present day, and is covered with leather.[1] He also invented a special perforator, blunt hooks etc. [His "Treatise on the Theory

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[1] This is no longer true. (H.)

and Practice of Midwifery" appeared at London 1752.] — If Smellie gloried in instruments,

WILLIAM HUNTER (1718–1783),
on the other hand, was an enemy of instrumental midwifery, and a special opponent of the forceps. Indeed, he was in the habit of exhibiting his own forceps to his hearers all covered with rust. Hunter recommended version by the breech, described the membrana decidua Hunterii, and published in 1774 an elegant "Anatomia uteri humani gravidi tabulis illustrata" in Latin and English.—A rival of these obstetrical worthies was the eminent observer

THOMAS DENMAN (1733–1815),
who rendered excellent service by his teachings relative to natural labor, recommended artificial induction of premature labor in cases of great contraction of the pelvis instead of Cæsarean section (the former operation was first performed by the obstetrician Macaulay in 1756), and spontaneous version in arm presentations (Denman's version), observed the portability of puerperal fever by physicians and nurses etc. He too was no great admirer of the forceps and of instruments generally. " His "Introduction to the Practice of Midwifery" appeared in London, 1787.

JOHN AITKEN,
a professor in Edinburgh, who committed suicide in 1790 while laboring under delirium tremens, invented the operation of sawing out a piece of the pelvic bones (pelviotomy) to replace Cæsarean section, and a thimble for puncture of the membranes etc. [His "Principles of Midwifery or Puerperal Medicine" appeared at Edinburgh in 1784.]

SIR FIELDING OULD (1710–1789),
a famous Dublin obstetrician and a pupil of Grégoire, advanced our knowledge of the progress of the head during labor, invented a drill-shaped perforator etc. [A treatise on midwifery, Dublin, 1742.]

SIR RICHARD MANNINGHAM (died 1749) of London
looked upon podalic version as the chief means for terminating difficult labors, though he also mentions the forceps. [In 1736 he established in his own house the first private lying-in asylum in London. His "Artis obstetricariæ Compendium tam Theoriam quam Praxin spectans", a collection of obstetric aphorisms, appeared at London in 1739.]

ROBERT WALLACE JOHNSON (about 1769)
observed the normal course of labor, was the first to teach the oblique position of the head at the pelvic outlet, measured the pelvis with the simple hand and brought forward a forceps with a strong pelvic and perineal curve. [New System of midwifery, London, 1769.]

JOHN BURTON (1697–1771) of York
supplied some observations on living children delivered by Cæsarean section after the death of the mother, and devised the "lateral position" for parturient women. His "Essay towards a complete new System of Midwifery" appeared at London, 1751.

WILLIAM OSBORNE (1732–1808) of London
was an opponent of Cæsarean section, in place of which he recommended perforation, even in the case of living children. He developed the doctrine, since his day in vogue in England, that the child may be sacrificed to the safety of the mother. His "Essays on the practice of midwifery in natural and difficult labors" appeared at London in 1792.

JOHN LEAKE (died 1792) of London,
whose name will be again mentioned in connection with the subject of instruction in

midwifery, recommended in profuse hæmorrhages to wrap the legs in cold wet towels, invented a forceps etc. [He wrote a text-book entitled "Lecture introductory to the theory and practice of midwifery", London, 1773.]

[To whom we may add:

WILLIAM GIFFARD,

"Surgeon and man-midwife" of London, whose "Cases of midwifery", published posthumously by Edward Hody in 1734, was the first English work to describe and *depict* the English forceps. Giffard describes a case in which he employed his "extractors" in 1726.

EDMUND CHAPMAN of London,

whose "Treatise on the improvement of midwifery" etc. (London 1733) contributed largely to the diffusion of a knowledge of the midwifery forceps, though he gave no plate of his forceps until his second edition in 1735. Chapman was very conservative in his teachings, believing that almost all cases could be terminated by the hand or the forceps. He had employed the forceps at least as early as 1723.

ALEXANDER HAMILTON (died 1802),

professor of midwifery in Edinburgh and author of "Elements of the practice of midwifery" (1775), with treatises on the diseases of women and children.

GEORGE COUNSELL,

a surgeon and obstetrician of London, who in his "Art of midwifery" etc. (London 1752) recommends emetics and sternutatories to facilitate labor, together with manual dilatation of the os uteri in rigidity of that organ. He thinks that footling presentations always demand artificial aid, and that face presentations, incapable of conversion into that of the occiput, require version or the forceps.

BARTHOLOMEW MOSSE (1712–1749) of Dublin,

who in 1745 founded at his own expense the Dublin Lying-in Hospital, the first institution of its kind in Great Britain.

Treatises on midwifery were also published by Benj. Pugh of Chelmsford (1748); William Rowley of London (about 1789); James Sims (1741–1820), who edited in 1787 "The principles and practice of midwifery by Edward Foster"; and Charles White of Manchester (1772), who has been already mentioned for his introduction of resection.

Edward Rigby (1747–1821) of Norwich wrote a famous treatise on ante partum hæmorrhage (1775).

Cæsarean section was discussed by William Simmons of Manchester (1798), James Vaughan of Leicester (1778), the father of Sir Henry Halford, and Wm. Dease of Dublin (1785). Nathaniel Hulme of London (1772) and Philip Pitt Walsh (1787) studied the subject of puerperal fever. Thos. Dawkes of Huntington wrote a manual for midwives (1736); Thomas Thompson (1752), a vindication of man-midwifery, while Elizabeth Nihell, a midwife of London (1760), opposed male midwifery and instrumental delivery. -- Chas. Nich. Jenty, professor of anatomy and surgery in London, supplied in 1758 some plates of the pregnant uterus; James Parsons, an "Elenchus gynæcopathologicus et obstetricarius" (London, 1741), and Dan. Peter Layard of London, a "Pharmacopœia in usum gravidarum, puerperarum" etc. (1776).

Drinkwater of Brentford, who left among his effects a pair of forceps (he died 1728); John Mawbray, whose "Female physician" appeared in 1724, and who is said to have been the earliest teacher of midwifery in Great Britain; Maxwell Gartshore (1732–1812) of London and Joseph Clarke (1758–1834), master of the Dublin Lying-in Hospital, also merit mention. H.]

f. The Dutch,

besides the obstetricians more or less connected with the forceps-question. *viz.* :

Cornelius Bokelman, Jan de Bruin, Plaatmann, Abr. Titsingh, Jac. de Visscher, Hugo van de Poll, Rathlauw, Joh. Dan. Schlichting (born 1705), van der Swam, Corn. Plevier,

can point to the versatile Pieter Camper alone as an obstetrician of greater importance. He was the author of the proposal of symphyseotomy. After Joh. Huwé (died 1725) of Haarlem had first undertaken obstetrical measurements and Deventer had first pointed out the inclination of the pelvis (Levret wrote on the subject without any measurements), Camper also determined more carefully the pelvic axis and gave the inclination of the pelvis at 75° etc.—In Holland, whose medical schools the Northmen of that day preferred to attend, was educated the

g. Dane

Balth. Joh. von Buchwald (1697 to after 1760), professor in Copenhagen, whose pupil, the famous

CHR. JOH. BERGER (1724–1787)

was the teacher of the Danish obstetrician

MATTH. SAXTORPH (1740–1800).

Saxtorph rendered good service in his teachings relative to natural delivery of the head, and in the introduction of the forceps into Denmark. He even brought forward a forceps of his own.

The forceps were first introduced into Denmark by Janus Bing (1681–1751), who must not be confounded with the versatile Janus Bang (1737–1808), a pupil of Saxtorph. Bang in 1774 fixed the angle of inclination of the pelvis very nearly correctly at 55°, and also taught the mode of entrance of the shoulders into the pelvis — In

h. Sweden

Herm. Schuetzerkranz (1713–1802) and Joh. Kraak (1745–1810) were teachers of midwifery, and Olof af Acrel also devoted his attention to this branch. Among the

i. Russians

Baron Jos. Jac. von Mohrenheim was active, though he did not specially advance the art.

6. ANATOMY AND PHYSIOLOGY. PATHOLOGICAL AND GENERAL ANATOMY.

Anatomy, after the cultivation which it had received in the preceding century, could point in the 18th century not so much to numerous and brilliant discoveries, as to a more thorough study of individual branches and of departments as yet little investigated. The harvest to be reaped by easy labor had diminished. Hence, anatomy at this period (as still more in our own age, which devotes itself especially to its varieties and topographical relations) was directed to the more minute, less striking and more difficult parts. In addition, the task of attaining the utmost possible thoroughness in description and exposition was assigned to it more and more, and together with this, the elaboration of anatomical facts with an eye to physiology, and yet without neglecting the search for novelty. On the whole, there prevailed in anatomy, which now had more material at its disposal, a tolerably active life. This may be judged from the considerable number of capable investigators who dedicated their powers to this subject, as well as from the not inconsiderable number of new ideas and facts which they acquired.

Microscopic anatomy, which had been created and at once extensively studied in the 17th century, suffered, like normal anatomy, a relative quiescence. It may be remarked that Brisseau-Mirbel held that the tissues — he applied his theory chiefly to plants, but it was subsequently transferred to the animal tissues — originated from cellular and tubular structures; Medicus looked upon them as originating from fibres; Sprengel, from vesicles, whose growth was accomplished by the reception of water, and Wolff, from drops of the succus nutritius (subsequently named by Hugo von Mohl "protoplasma"), which transformed themselves into cell-cavities.

Pathological and general anatomy, both of which were destined to control the medicine of the 19th century, were newly created, not indeed as sciences *per se*, but yet as special branches of science.

A still more important acquisition of the 18th century in the sphere of the fundamental sciences of medicine was unquestionably the revival and more active study of experimental physiology, a field which, from the works of Galen on this matter down to the time of Harvey (who certainly made a most brilliant beginning), had lain almost entirely fallow, and even after Harvey's discovery had once more remained rather quiet.

a. The Germans.

This revival, which marks a genuine epoch in the history of medicine, was effected by the German-Swiss

Albert von Haller (1708–1777) of Berne, a man generally called in the last century (like Hippocrates in his own age) "the Great". Haller was a universal and indefatigable savant, of ingenious natural endowments, marvellous, almost unique, capacity for work and conscientiousness, a man of inextinguishable love for art and science and one of the greatest medical thinkers of all time, one who distinguished himself too as a notable poet, botanist and statesman.

In art, science and life Haller was an almost typical representative of the Swiss. He possessed in the highest degree the assiduity, industry and tenacious endurance of his nation. As a poet too, he, like all Swiss poets down to the present day, never passed beyond the didactic and the home-spun. His life was one of the graetest modesty. Yet he also possessed disputatiousness, love for his country and his countrymen, and the lordliness, the self-esteem and the aristocratic devoutness (the latter in Haller's old age degenerated into actual pietism,[1]) peculiar to republican patricians, from one of whose most respected families he sprung. His father was a jurist. He died, however, when the young and sickly Haller was only twelve years old, though no trifling scholar. For since his eighth year Haller, yielding to a premature passion for literary compilation, besides his ordinary school tasks had prepared compendiums on the signification of German and foreign words, and 2000 biographical extracts from the dictionary of Bayle and Moréri. The latter he subsequently utilized in his "Bibliothecæ". From his tenth year he wrote poems in Latin and German. At fifteen he went to the university of Tubingen, where Duvernoy and the botanist Rud. Jac. Camerarius (1665–1721), the first accurate describer of the sexual organs of plants (Thomas Millington as early as 1676 had pointed them out), were his teachers. In the second year of his sojourn at Tübingen he wrote an anatomical article in opposition to Coschwitz. In 1725 Haller went to Leyden, where Boerhaave and Albinus gained in him their most industrious pupil. At the age of 19 he received his degree of doctor, after which he began his long dispute with the iatro-mathematician Hamberger and made a trip to England, where he enjoyed the anatomical instruction of James Douglas (1675–1742), who desired to retain Haller with him. The latter, however, preferred to go to Paris in order to hear le Dran and Winslow. In the excess of his zeal for anatomy — in Tübingen he had dissected dogs and in Leyden purchased for a considerable sum from Albinus the half of a corpse — he here engaged in grave-robbing, and betrayed by the foul odor, was compelled to save himself by flight. Accordingly in 1728 he went to Basel, studied here botany especially and mathematics under Jean Bernoulli (1667–1748), and lectured upon the former subject during the sickness of professor Mieg. Next Haller undertook a botanical journey through Switzerland in company with Joh. Gesner, and then settled as a practising physician in his native city. He did not, however, neglect to continue his botanical studies and to write poetry, so that in 1732 he published anonymously his first collection of poems. Most of his poems originated during this his first residence in Berne. At the age of 26 he was appointed director of the hospital in Berne and professor of anatomy, in which latter position he occasioned the erection of an anatomical theater. In 1735 he received, in addition, the position of city librarian, but a year later accepted a call to Göttingen as professor of anatomy, surgery, chemistry and botany. As he was entering upon the unpaved streets of Göttingen the wagon overturned, and as the result of this fall Haller's first wife Marianne, so deeply lamented in his poems, met her death. His second wife he lost in childbed, together with the infant, but his third, a daughter of professor Teichmeyer, bore him four sons and four daughters. In 1739 Haller was appointed English physician-in-ordinary, ten years later an English state-counsellor, while he was also made one of the nobility of the empire by Maria Theresa and her uxorious spouse, the emperor Francis I. He was the founder of the botanical garden, anatomical theater and hall of anatomical drawings in Göttingen, and of the "Königliche Gesellschaft der Wissenschaften". Of the latter society he was the first and permanent president as long as he lived. In 1752 he published his famous researches upon the subject of irritability. As early as 1745 Haller had been received into the great council of his native city, and he continued to be a member of the great council, when he returned there forever, until chosen Landammann of his native canton. In spite of the severe labors which the public business of the largest of all the Swiss cantons occasioned him, he was enormously active in literary matters, as is shown by his physiology, his numerous critical writings and his famous "Bibliothecæ", in the compilation of which he was assisted by his pupils, his wife and children. He himself, however, was so busy that for a long time he slept and lived in the library. Yet, in spite of his quite unique and enormous correspondence with the savants of the whole world, Haller never left a letter unanswered.—Haller's permanent influence upon practical medicine was only an indirect one. His chief importance is to be found more upon the theoretical side of the healing art, though he introduced into Germany the use of the watch for the purpose of counting the pulse. Although he was a professor of surgery and performed many vivisections, he was never able to persuade himself to perform a single surgical operation.

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[1] Still worse he is reported by one biographer to have said upon his deathbed that he believed nothing at all.

From what has just been said, to merely indicate here the services of Haller is impossible. Haller, like Aristotle, demands a special historian of his own, and only an equal mind can estimate him completely and correctly. We point out only a few of his services:

Haller's anatomical discoveries were almost all made during his investigations on his chief doctrines and with reference to them, and thus concern such structures as come into consideration in those doctrines. Thus e. g. he enriched the anatomy of the heart, an organ upon which he had made numerous studies with reference to his doctrine of irritability; then that of the brain, the dura mater, to which he denied nerves; he pointed out the venous nature of the sinuses, described the pes hippocampi, studied more carefully the anatomy of the organs of generation, including the uterus (which he taught should be regarded as a muscle), the testicles etc. Besides he advanced our knowledge of the lymphatic system by proving, in opposition to

Georg Daniel Coschwitz (1679–1729),

the famous professor of anatomy in Halle, that the lingual veins were no salivary duct.

In the history of development he made more complete researches into the development of the fowl (proving e. g. that in the 38th hour the first trace of the heart showed itself, in the 41st the first trace of red blood etc.), and refuted many errors of the investigators of the 17th century. A follower of the theory of preformation or evolution,[1] he also threw light upon the history of development of the mammalia by his investigations upon sheep, goats and cows, defended the formation of the corpora lutea in the place of the expelled ovule, taught the origin of the decidua in the first 13–17 days etc. In his theory of development he followed the assumption that, since the creation of the genus, every individual is descended or derived from a preceding individual.

In the physiology of the circulation Haller studied the mechanism of the motion of the heart. The internal cause of this motion he regarded as irritability, which was maintained by the blood as a merely accidental and external cause.—He pointed out the filling of the coronary arteries during the systole of the heart, but denied to the arteries all motive power, assigning the latter to the heart alone, since the pulsations of the heart and those of the smallest arteries were felt at the same time.—The pulmonary veins, according to Haller, are smaller than the pulmonary arteries because the route of the blood in them is shorter, and accordingly more quickly accomplished.

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[1] That in the year 1756 a notary, Martin Frobenius Ledermüller, was compelled to defend the existence of the spermatozoa against the theologians is not so remarkable as that a notary should be willing to undertake such knightly service. Again, as early as 1728, Emmanuel Sinttema, far in advance of his time, taught in a popular treatise that in women and maidens an ovule wandered from the ovarium each month into the uterus, that menstruation was in this sense a purification, that by it the uterus was enabled to receive an ovule (See Geyl, Arch. für Gynäcologie, 1887).

The reflux in the veins is stronger and easier during expiration, while the arterial afflux is favored by inspiration etc. In the physiology of digestion he was acquainted with the usefulness of bile (regarded by Aristotle as a useless excrementitious product) in the digestion of fat.

As regards the mechanism of respiration he refuted Hamberger, who taught, like the Ancients, that the lungs contract independently, a doctrine which involved necessarily the assumption that air existed in the pleural sack to restore the equilibrium of the pressure of the air within and without. Haller's success was such that the learned Hamberger, while obstinately defending his own opinion during life, declared upon his deathbed that he was conquered.

The most brilliant contribution of Haller to the physiology of the nervous system, however, was his refutation of the doctrine of the oscillatory motion of the nerves which had heretofore generally prevailed, and his administration of the death-blow to the doctrine of the vital spirits. In this he was, so to speak, the Harvey of nervous activity. As Harvey was the father of the modern physiology of the blood and of the changes of matter, so was Haller the father of our modern nervous physiology.

Haller proved convincingly that sensation takes place in the nerves, or occurs only in organs endowed with nerves.

If in the preceding points Haller had acquired many opponents and numerous followers, the same was true in the widest degree of the world-famous

Doctrine of Irritability,

— proof enough of its importance and its scope. It moved all the minds of the century — and not in the department of medicine alone — in a way of which we of the present day have no satisfactory conception, unless we compare it with our modern Darwinism.

Glisson, as we have already seen, established deductively the principle of a general irritability. Haller proceeded to follow up this principle by the inductive method, proving its existence by experiment. But, in contrast to the generalization of Glisson, he demonstrated that this irritability was something entirely special, a simple peculiarity of the muscular substance, opposed to sensation as the second vital phenomenon.

As early as the year 1739 and again in 1743 Haller wrote that "irritability" was the cause of muscular movement, and in his physiology, published in 1747, he gave "dead nervous force" (elasticity), "innate nervous force" (irritability) and "nervous force in itself" as the three forces which produce muscular movements. The first investigations relative to this subject, however, were published by Zimmermann, under the direction of Haller, in a dissertation "De irritabilitate" presented for the attainment of the Doctorate in 1751. Of this dissertation Haller said "that his learned and industrious pupil here imparts the thoughts and observations of his master, and that he himself (Haller) intends to write upon this subject as soon as he has obtained more light". In the following year Haller himself gave an account of 190 experiments (he described altogether 567) undertaken for the purpose of determining those parts of the body which possess "irritability". He found that this irritability existed in the muscular substance alone, entirely independent of the nerves proceeding to it, and although a long dispute was waged over the question whether nerve or muscular substance involved the contraction — a dispute not decided until our own day — Haller's original idea remained established. For it has been shown that curarized animals, or their muscles, still react to salts, high grades of heat, cold, acids, alkalis and the electric current, and that the same thing occurs in muscles without nerves, as in the extremities of the sartorius in the frog. Moreover the contraction is different when the nerve is transversed by a constant current and when this current flows through the muscle itself. In the former case there are merely contractions upon opening and closing the current; in the latter the contraction continues as long as the current in passing.

According to Haller there are:

"Sensible parts: brain and nerves. Through the latter: the skin, muscles, stomach, intestines, ureters, uterus, vagina, penis, tongue, retina and heart. Intestines and glands have little sensibility.

Insensible parts: epidermis, cellular tissue, fat, tendons, coats of the intestines and joints, the dura and pia mater, ligaments, periosteum and pericranium, bones, marrow, cornea and iris. Arteries and veins are generally insensible.

Irritable parts: heart, muscles, diaphragm, stomach and intestine, lymphatics, thoracic duct, bladder, bursæ mucosæ, uterus and genitalia, which possess a peculiar irritability.

Non-irritable parts: nerves, epidermis, skin, membranes, arteries, veins, cellular tissue, viscera, excretory ducts of excreting organs.

All parts in which are found both nerves and muscular fibres are at once sensible and irritable. Such are muscles, the heart, alimentary canal, diaphragm, bladder, uterus, vagina, and genitalia.

All these researches of Haller deserve increased recognition from the fact that he lacked the aids of our modern physiologists. The earliest German physiological institute was founded by Purkinje in Breslau somewhere in the forties of the present century. Joh. Müller, the great successor of Haller, possessed no such advantages. Doubtless the physiologists of that day did not believe in Schiff's famous dictum, that for every dog rescued from vivisection a human life must perish.

(Investigations relative to the "Glissonian irritability" ran parellel to those on the Hallerian. With the former (common to all fibres) were occupied after 1746: Friedrich Winter (1712–1760), professor in Franecker and Leyden and his pupil Joh. Lups of Moscow, who allotted irritability to plants; Lambert, Bicker, Joh. Wolfg. Manitius, who classified irritability in accordance with the temperament and period of life; Iman Jac. van den Bosch, Walther van Doeveren (1730–1783), who agreed in many things with Haller; Jan de Gorter (1689–1762) professor in Harderwyk etc.) Haller is also the founder of experimental pathology, since he was the first to inject putrid matters into the veins of animals, by which the victims speedily perished. He ascribed the plague to the presence of putrefying matters in the air.

The profound impression made by the doctrine of Haller upon his contemporaries may be measured by the number of his supporters and opponents. Still the former defended, as the latter opposed, for the most part, only one feature or another of Haller's doctrine, and it is therefore difficult to definitely distinguish the two. Among the followers of Haller who departed but little from the ideas of their master, we may reckon:

Joh. Gottfr. Zinn (1727–1759), professor in Göttingen and one of Haller's favorite pupils, who published a work on the anatomy of the eye, adorned with very perfect plates, and whose name has been preserved in the zonula of Zinn; Tissot; Felice Fontana (1730–1805), of the Italian Tyrol, professor in Pisa, an anatomist who, like Zinn, gave his special attention to the eye (canalis Fontanæ), and is well known as an artist in anatomical preparations in wax; Georg Heuermann (died

1767); Georg Christ. Oeder (1728–1791), professor in Copenhagen; Joh. Gg. Röderer; Karl Abraham Gerhardt (1738–1821); Heinrich Nepomuk Cranz; Peter Castell; William Battie (1704–1776), a physician of London; Richard Brocklesby (1724–1797); Toussaint Bordenave (1698–1782); E. J. P. Housset, professor in Montpellier; Urban Tosetti; Marc. Ant. Caldani (1725–1813), professor in Padua; Pietro Moscati (1736–1824), professor in Pavia; Giov. Franc. Cigna, professor in Turin; Giov. Batt. Verna, a surgeon of the same place, and many others.

Irritability was extended to the smallest vessels or arteries by: Walther Verschuir; Pierre Ant. Fabre, professor in Paris, a pupil of Petit and an eminent syphilographer, who established the total difference between the symptoms of syphilis and gonorrhœa; Christ. Ludw. Hoffmann; Christ. Cramp; Heidenreich van den Bosch; Guil. de Magny; G. M. Gattenhof, professor in Heidelberg and a teacher of Joh. Peter Frank; Borsieri; Daniel Magenise (Maginnis?) and others, some of whom, like Gaub and Unzer, applied the doctrine of irritability to pathology.

Finally the fundamental force of the body, of which irritability and sensibility were mere modifications, was allotted to the cellular tissue by:

Matth. van Geuns (died 1816), Georg Wilh. Benefeld, Joh. David Grau, A. G. Weber in Halle (1783), Joh. Ludwig Gauthier in Breslau (1793) and others.

Unconditional, or more or less conditional, opponents of the doctrine of Haller were:

Robert Whytt, the partisan of Stahl, who gave vogue to the idea that the excessive pain of the incision through the skin, always occasioned in vivisections, altered and increased the sensibility of the parts; Karl Christ. Krause (1716–1793), professor in Leipzig; Georg Heinrich Delius (1720–1791), professor in Erlangen, who opposed Haller on à priori grounds; Ant. de Haën, who subsequently became a covert to the doctrine; Andr. Müller, professor in Giessen; Batt. Bianchi (1681–1761), professor in Turin, his birthplace; Domen. Sanseverini, professor in Naples; P. Petrini; Dom. Vandelli and Car. Mich. Lotteri, professor in Turin; Thom. Laghi, professor in Bologna, and many other Italians, who were, of all nations, the greatest students of the doctrine of Haller. Among the French were Lorry, Cl. Nic. le Cat, Jean Pierre Jausseraud, Louis Girard de Villars, Ch. Geille de St. Leger etc.

Among the medical systems which we have heretofore considered, the nervous pathology of Cullen, the doctrines of Gaub and Unzer, Vitalism, Brunonianism and its offshoots, with some others, were closely related to the doctrine of Haller.—But la Mettrie too, who has been recently rehabilitated by the Berlin physiologist Dubois-Reymond, built up his denial of the spirit upon Haller's "irritability".

The theory of development, through Haller's investigations, gained a new impulse. He embraced, as above intimated, the views of Harvey, i. e. the theory of the preformation of all parts in the germ, and that these parts then merely grow (theory of evolution). On the other hand the St. Petersburg professor

CASPAR FRIEDRICH WOLFF (1735–1794) revived the theory of epigenesis or post-formation, which Hippocrates and Aristotle had already adopted, and which regards generation as an actual new creation.

Wolff, the first meritorious investigator in Russia and the pioneer in the history of development, was followed at a later period in that country by Pander and Baer. He taught that in the incubated hen's egg the blood-corpuscles move before the heart and the blood-vessels, and described the Wolffian bodies which bear his name. The latter, however, he did not recognize as envelopes of the egg. The mammalian ovum was first discovered by Baer. Wolff, however, was the first to teach the doctrine of the blastodermic membrane, according to which all organs first assume the form of membranes, a doctrine which Pander subsequently perfected. Wolff was also the first to call attention to the fact that in the cellular tissue no proper cell-cavities exist.

The famous JOH. FRIEDRICH BLUMENBACH (1752–1840) of Gotha, and after 1776 a professor in Göttingen, was the author of the doctrine of the nisus formativus (Bildungstrieb),

i. e. of a peculiar impulse, in addition to irritability and sensibility, belonging to every animal body as a part of its vital force, an impulse to maintain itself and to reproduce itself (in the sexes) within itself and the species. This impulse, in its regular operation, manifests itself in generation, nutrition and reproduction; when disturbed it produces arrest of development. — Blumenbach rendered much greater service by his anthropological investigations than by this theory, so famous in its day. He may in fact be called the founder of anthropology, and his researches regarding the formation of the skull in different races (he possessed an almost unique collection of skulls, his "Golgotha") and his activity in the study of comparative anatomy, physiology and the history of development, have rendered him justly famous. He was one of the busiest and most popular of university professors, and endowed with such attractiveness that Göttingen gained greatly in its patronage through his influence. His text-books of physiology, comparative anatomy, natural history etc. survived numerous editions.

Besides the physicians already mentioned, the following also distinguished themselves as anatomists and physiologists:

Joh. Juncker (1679–1759), author of "Grundriss der Physiologie"; Christian Jac. Trew (1695–1769), ordinary-physician of Ansbach and president of the "Academie der Naturforscher" (osteology and investigations on the fœtus and the new born); E. J. von Wachendorf (discovered the pupillary membrane in 1737); Carl Sam. Andersch (died at Königsberg in 1777; discovered the ganglion petrosum and distinguished the 9th, 10th and 11th cerebral nerves as distinct nerves); Johann Friedrich Schreiber (1704–1760), to whom Morgagni dedicated one book of his work; Christ. Gottl. Ludwig (1709–1773), "Physiologie"; Johann Friedrich Cassebohm (died in 1743), professor in Halle (investigations on the ear). More important was Josias Weitbrecht (1702–1747), professor in St. Petersburg, and author of a famous treatise on syndesmology; highly famous was Joh. Nath. Lieberkühn (1711–1765), a practitioner of Berlin who distinguished himself as an artistic injector, microscopist (he invented the solar microscope in 1738) mechanician etc., and whose name has been preserved in the glands of Lieberkühn.

Heister, Joh. Ad. Kulmus, (1689–1745), professor in Danzig; Joh. Fried. Meckel, the grandfather (1724–1774), who described the nerves, bloodvessels and lymphatics, glands and their excretory ducts etc.; Phil. Ad. Böhmer, were all good anatomists, and even the poet and professor of anatomy in Frankfort-on-the-Oder, Joh. Phil. Lorenz Withof (1725–1789) who wrote on leprosy, the hair etc., deserves to be mentioned.

Better known anatomists were the scions of the distinguished school of Strassburg: Joh. Jac. Salzmann (1679–1738), who injected the lymphatics with milk, quicksilver etc.; Goethe's teacher in anatomy Joh. Friedrich Lobstein (1736–1784), professor in Strassburg; Joh. Fried. Lobstein Jr. (1777–1835), founder of the Strassburg museum of pathological anatomy; and the more important Thomas Lauth (1758–1836). Besides these we must notice Joh. Ernst Neubauer (1738–1777), professor in Jena; Otto Justus of Wreden in Hanover (topographical anatomy, 1736); Joh. Gottlob Haase (1739–1803), professor in Leipzig; Lorenz Gasser of the old Vienna school (ganglion Gasseri); Ehrenritter, prosector for Barth, who wrote a treatise on the muscles and described the tympanic nerve and jugular ganglion of the glossopharyngeal nerve; Phil. Fr. Theodor Meckel, the son (1756–1803), professor in Halle, and Georg Fried. Hildebrand (1764–1816), professor in Erlangen, author of a famous textbook on anatomy and physiology, distinguished themselves as anatomists, and the same may be said of H. A. Wrisberg (1739–1808), professor in Göttingen, who described the larynx, diaphragm, and sympathetic nerve etc. Less eminent was Joh. Jac. Huber (1707–1778) of Basel, professor in Göttingen and Cassel, who described the spinal cord.

JOH. GOTTLIEB WALTER (1739–1816),

professor of anatomy and midwifery in Berlin, was a deserving osteologist, founder of the anatomical museum of Berlin and the owner of a famous anatomical collection, which his son

FRIEDRICH AUGUST WALTER (1764–1826),

likewise professor of anatomy in Berlin, has described.

JUSTUS CHRIST. VON LODER (1753–1832) of Riga,

professor in Jena, Halle and subsequently in Moscow, likewise enjoyed a high reputation. In Russia he performed good service in the elevation of anatomical instruction. He also possessed a considerable anatomical collection.

One of the most famous and meritorious anatomists of the 18th century was indisputably

SAMUEL THOM. VON SÖMMERRING (1755–1830),

who enlarged and improved anatomy by numerous works, securing for almost all parts of the body, particularly the organs of sense, the results of his careful labors by excellent plates (in copper), furnished him by the artist Christian Köck.

Sömmerring was born in Thorn. The son of a physician, he had studied in Leyden under Albinus and Boerhaave, and subsequently in Göttingen. At the age of 29 he was appointed a professor in Mayence, then in Cassel, and afterwards practised in Frankfort-on-the-Main until he became physician-in-ordinary and a fellow of the Academie in Munich in 1804. In 1820, however, he returned as a practising physician to Frankfort, and upon his death left to this city his noble collection. He wrote numerous works, including a widely famous "Vom Baue des menschlichen Körpers", Frankf., 1791–96. His work on the eye, however, is regarded as his best. In this he described, among other things, the foramen centrale of the macula flava and the macula itself (independently of Buzzi). He also distinguished the facial and auditory nerves from each other. — The most important anatomist among

b. The Dutch,

indeed, one of the greatest of all anatomists, was

Bernhard Siegfr. Albinus (Weiss, 1697–1770) of Frankfort-on-the-Oder, who from his 24th year until his death was professor of anatomy in Leyden.

With the aid of the artist Jan Wandelaar (1692–1759) of Amsterdam he furnished artistically perfect plates, especially of the skeleton and muscles. Jan Ladmiral prepared colored impressions for the arteries and veins. Albinus, among many other things, was the first to demonstrate by injections the connexion of the vascular systems of the mother and the fœtus etc. His brother

Friedrich Bernhard Albinus (died 1778) never attained the same importance. Ed. Sandifort (1742–1819), from 1770 professor of anatomy in Leyden, must also be mentioned as an anatomist of great reputation (osteology, splanchnology, myology etc.). Cornel. de Courcelles (muscles of the head and foot) and Pieter Camper (Camper's facial angle) were also distinguished as anatomists. — The Dutch anatomists first mentioned were likewise the teachers of the most important German physicians and anatomists of the last century. — Among the

c. English

anatomists were the physicians already adduced as important surgeons: William Cheselden ("The anatomy of the human body", 1713; "Osteographia, or the anatomy of the bones", 1733); Alexander Monro, father and son; William Hunter ("Anatomia uteri humani gravidi"), the first professor of anatomy to the Royal Academy in London, in which position he was succeeded by John Sheldon (died 1808), and Sheldon by Sir Anthony Carlisle; John Hunter; William Porterfield, who has been already mentioned among the Iatro-mechanics of the 17th century, and who, together with Henry Pemberton and Thomas Young, devoted his attention prominently to the anatomy of the eye; Stephen Hales, who has likewise been already mentioned, and who was eminent for his investigations relative to the movement of the blood; he also, in conjunction with the physician next mentioned, demonstrated the necessity of the spinal cord for the reflex movements first indicated by Descartes; Robert Whytt, and finally the eminent investigator William Hewson (1739–1774), who wrote upon the blood and the lymphatic system, all of whom were anatomists of weight.

The famous, peripatetic physician John Tuberville Needham (1713–1781) of London rendered himself eminent as a microscopist and investigator of the history of development, while William Cruikshank (1745–1800), the assistant and friend of William Hunter and the discoverer of urea, was a distinguished anatomist. The world-famed John Bell (1763–1820), not to be confounded with an elder John Bell (who lived 1691–1780), wrote a treatise on anatomy, often reprinted. He was the elder brother of Sir Charles Bell, the eminent surgeon and physiologist of London.

[The Scotchman James Douglas (1675–1742), a famous teacher of anatomy and surgery in London, also deserves mention here. Haller was one of his pupils. Douglas's "Myographiæ comparatæ specimen" appeared at London in 1707. He also published a very careful description of the peritoneum in 1730.

Among the less important anatomical writers of England in the 18th century were: James Drake (1667–1707: A new system of anatomy, 1707) of London; Frank Nicholls (1699–1778), ordinary physician of George II. (Compendium anatomicum. 1732); the Jesuit missionary in South America, Thomas Falkner (1710–1780; De anatome corporis humani, 1754); Charles Nich. Jenty (1757); William Northcote (1772); Sam. F. Simmons (Anatomy of the human body, 1778); John Brisbane (The anatomy of painting etc., 1769); Robert Hooper of London, author of "The anatomist's vade mecum" (1797) and numerous other medical text-books. H.]

d. The Italians.

Anatomy, the national department of the Italians in medicine, was studied by them excellently in the 18th century.

Antonio Maria Valsalva[1] (1666–1723) of Imola

must be mentioned as the earliest important Italian anatomist of this epoch. He had the good fortune to be a pupil of the great Malpighi and the teacher of the still greater Morgagni. He followed Malpighi in the professor's chair at Bologna and rendered good service to anatomy, particularly by a work upon the ear, in which he described and depicted its most minute muscles and nerves. Valsalva's method of inflating the middle ear is well known.

Giov. Domen. Santorini (1681–1737) of Venice,

a professor in that city, was an excellent anatomist who described the emissaria Santorini, the corpuscula Santorini of the larynx, the cartilage of Santorini in the nose, the musculus risorius Santorini of the face, the muscles of the anus, penis etc. He also described the corpora lutea, but assigned semen to the female as well as the male. Some excellent plates, which originated with Santorini, were published 28 years after his death by

Mich. Girardi (1731–1797),

the successor of Morgagni as professor at Padua.

Giov. Batt. Bianchi (1681–1761) of Turin,

professor in Bológna and then in his native city, made himself well-known by his investigations relative to the liver (Historia hepatica, 1725). A more skilful and earnest anatomist, also active in Turin, was

Giov. Batt. Fantoni (1675–1758),

son of the professor of the same name who died in Turin in 1692.

Dom. Cotugno (1736–1822) of Ruvo in Naples,

a man who rose from the deepest poverty, is well-known from his very profound investigations concerning the internal ear (aquæductus and aqua Cotunnii). He was also in 1770 the first to demonstrate by boiling the existence of albumen in the urine.— The brain, particularly the cerebellum (even in crétins), the sinuses of the nose etc. were investigated by

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[1] He was a believer in the generatio æquivoca because in liquids which he had heated and then enclosed in vessels he still found microscopic animals. Spallanzani, on the other hand, heated his liquids in the vessels themselves, then closed them, and finding no organisms present, concluded that the exclusion of air, not that of germs, was the reason of their absence.

Vincenzo Malacarne (1744–1816) of Saluzzi,

professor in Pavia, Padua and Turin. In addition he produced a systematic treatise upon the tissues of the body and some chirurgico-anatomical works. On the other hand

Michele Troja (1747–1827), professor in Naples,

a native of Andria, who has been already mentioned, rendered himself eminent by works on the bones. — A teacher of the physician next mentioned was

Pietro Tabarrani (Tabarini, 1702–1780),

who, in addition to works on normal anatomy, wrote something also on chirurgico-pathological anatomy.

Paolo Mascagni (1752–1815) of Casteletto near Siena,

professor in Siena, Pisa and Florence, studied the lymphatics, and undertook the preparation of an atlas with plates of life size and colored after nature. This was afterwards published in lithographic copies of life size by

Francesco Antommarchi (died 1838),

a pupil of Morgagni and ordinary physician of the emperor Napoleon I.

Leop. Marco Antonio Caldani (1725–1813),

a professor in Bologna, Venice and Padua, is well-known by a magnificent anatomical work (Icones anatomicæ, 1813) adorned with copper-plates, which he published in conjunction with his nephew Floriano Caldani (died 1836), professor in Bologna, Venice and Padua.

The physicist and physiologist Lazzaro Spallanzani (1729–1799) of Scandiano near Reggio, a professor in Reggio, Modena and Pavia, and Antonio Scarpa (1747–1832) of Motta, a pupil and subsequently an assistant of Morgagni, were very eminent anatomists. Spallanzani specially distinguished himself by his investigations relative to the organ of smell, the ear, ganglia and nerves, minute structure of the bones etc. He was likewise the first who demonstrated experimentally the necessity of the conjunction of the semen and the ovum, by the artificial fecundation of the eggs of frogs and toads, and by the injection of warm semen into the vagina of a bitch he impregnated the latter. By these experiments Spallanzani became one of the reformers of the theory of generation and development, and lent his aid to the overthrow of the generatio æquivoca.

e. The French.

The French were never as independent and fertile in normal anatomy as in its surgical, topographical and pathological application. This was again shown in the 18th century. The ablest anatomist of France during this century,

Jacob Benignus Winslöw (1669–1760), of Odensee on the Danish island of Fühnen, was "an honorably born Dane, who, like Stenson (he wrote his name Stenonis), became a zealous Catholic, and — in 1732 at the Jardin des Plantes — an Academicus."

Winslöw, besides numerous "Mémoires" (foramen Winslowii), wrote a textbook of anatomy often printed and translated into several languages. Louis Jean Marie

Daubenton (1716–1799), François Chaussier (1746–1828) and Sénac (by his work upon the heart) should be classed among the more famous French anatomists. The same may be said of the cultivator of the history of anatomy,

ANTOINE PORTAL (1742–1832), of Gaillac in the department of Tarn, subsequently ordinary physician of Louis XVIII., who devoted his attention more to physiology and surgical and pathological anatomy than to ordinary anatomy. His "Histoire de l' anatomie et de la chirurgie" was published at Paris in 1770.

JOSEPH LIEUTAUD (1703–1780) of Aix, and a professor in that city until he became in 1749 physician of the royal children and in 1774 ordinary physician of Louis XVI., was author of "Essais anatomiques" etc., "Historia anatomico-medica" etc., and "Elementa physiologiæ". His name has been preserved in the trigonum Lieutaudii seu vesicæ.

EXUPÈRE JOS. BERTIN (1712–1781), of Tremblay near Rennes, wrote on osteology (ossicula Bertini, sphenoidal cornua) and the organs of voice.

Almost all the more considerable French surgeons of the 18th century (and the same is true of other nations, for lectures on anatomy and surgery were usually delivered by the same professor) were more or less important anatomists. Besides Ferrein, who has been already mentioned among the physicians of the 17th century, we may notice:

Garengeot; César Verdier (1685–1759), professor in the Académie de Chirurgie; Pierre Tarin, 1750 professor in Paris; Franç. Pourfour du Petit; Disdier (died 1781); Jean Jos. Sue (1710–1792), the grandfather, professor of anatomy and surgery in Paris; Jean Joseph Sue, his son (father of Eugene Sue, 1804–1857, the novelist), likewise professor of anatomy and surgery in Paris; Ténon (capsula Tenonis); Barbaut (died 1784); Antoine Petit; Sabatier; Pierre Demours (1702–1795; membrane of Demours, whose discovery was also claimed by Descemet -- died 1810) and others. Finally separate mention must be made of

FELIX VICQ D'AZYR (1748–1794) of Valogne, less, however, for his labors in the department of anatomy (origin of the brain and nerves) and physiology, than for his services in comparative anatomy (especially with reference to the vocal organs). Among

f. The Spanish,

besides Martino Martinez (about 1716), the surgeon Antonio de Gimbernat, who has been already mentioned, distinguished himself as an anatomist.

PATHOLOGICAL ANATOMY

originated as a special branch in that country whose national branch was anatomy in general, and which too in the 14th century had revived normal human anatomy, after it had lain fallow from the time of the Alexandrians and Galen. This country was Italy. The great founder of pathological anatomy as a science was

GIOV. BATT. MORGAGNI (1682–1772) of Forli.

Morgagni was a pupil of Valsalva, and at the age of 19 became his assistant, a position which he continued to hold until in 1715 he became Vallisnieri's successor as professor in Padua. It was not until his 79th year, and after he had published several works on normal anatomy ("Adversaria anatomica", 1706; "Epistolæ anatomicæ etc."; liquor Morgagni) — a great part of his works owe their origin to his disputes with Bianchi — that he allowed his famous book on pathological anatomy to appear. This work bore the title "De sedibus et causis morborum per anatomen indagatis libri quinque", Venice, 1761. It consisted of five books, the first dedicated to Trew, the second to Bromfield, the third to Sénac, the fourth to Schreiber, the fifth to Meckel, and contained 70 letters. Morgagni did not cease his work even when he became blind. To him we owe the maxim that observations should be weighed not counted He was as great a savant as an anatomist, and possessed a wonderful power of remembrance.

Morgagni, who regarded his great work as a continuation of that of Bonnet, was the first to devote attention extensively and thoroughly to the anatomical products of common diseases, while before him (since the 15th century) little but the rare discoveries in the body had been recorded. He also directed his attention to the preceding diseases and their history, taking up this subject himself or having the history related, and not confining his search to the seat of the present disease only. He, however, erroneously regarded the products of diseases as their cause, thus neglecting the remote causes. Even when the discoveries of pathological investigations were unable to promote the cure of disease, Morgagni found them of advantage, because they might throw light upon physiology and normal anatomy and the relations between the symptoms and results of disease, and prevent incurable patients from being continually tormented with drugs by the physicians. On the other hand, resort will be had more frequently to measures of palliation. Finally pathological investigations may settle the diagnosis, a matter of honor in itself so far as the physician is concerned, and a view which, as we know, in later times attained excessive popularity, so that for some time the curative function of the physician seemed to have been forgotten in the interests of diagnostic precision.

Besides Morgagni, other students of pathological anatomy, or portions of this science, were:

Lieutaud, Ed. Sandifort, Sénac, William Hewson, Ant. Portal, de Häen, Stoll and others. The most prominent of these pathological anatomists, however, was John Hunter, though he promoted the science more by lecturing and after his death by his noble pathologico-anatomical collection (purchased by the government and still regarded as a model of its kind), than by his writings.

MATTHEW BAILLIE (1761–1823),

a son of Hunter's sister, professor of anatomy and ordinary physician of the princess of Wales and one of the most eminent of pathological anatomists, described the preparations of Hunter's collection, though he was not always able to determine the preceding disease. He occupied himself chiefly with the pathological anatomy of the brain, the heart and lungs,[1] larynx, thyroid gland, abdomen, stomach and intestinal canal with their appendages, and the urinary and sexual organs. He also believed that the chief benefits of pathological anatomy were to be found in the fact that it opposed theories and taught one to perfect diagnosis, and to hold separate the individual phenomena. Baillie, however, admitted the cooperation in diseases of a certain something, unfathomable by our senses even when assisted by the knife. He understood the changes of form and structure of organs after diseases merely as their results and products. "Such changes themselves may then become again the cause of many symptoms." Baillie kept constantly in view the practical aims of medicine. His treatise entitled "The morbid human anatomy of some of the most important parts of the human body" appeared in 1793, and was translated into French, Italian and German. The copper-plates by Clift, designed to illustrate this work, appeared 1799–1802. — Besides Baillie, Hunter's brother-in-law

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[1] In 1793 he was the first to point out the gray miliary tubercles of consumption.

Sir Everard Home (1763–1832),

professor in the Royal College of Surgeons, was entrusted by Hunter himself with the duty of describing his collection. Home, however, burned ten (!) volumes of Hunter's own description of his collection, in order to appropriate to himself the sole credit for this work. Baer judges that Home must have been scientifically imbecile. — Hunter's pupil,

William Stark (died about 1770, aged 29 years)

distinguished himself by his investigations relative to tubercle, and was the earliest writer to distinguish between tuberculosis and scrophulosis. His "Works, consisting of clinical and anatomical observations with experiments, dietetical and statical" were published by J. Carmichael Smyth, London, 1788. [Stark's treatise on miliary tuberculosis, however, appeared in the "Medical Communications" for the year 1785.] —James Wilson (1765–1821) [wrote some "Lectures on the blood and on the anatomy, physiology and surgical pathology of the vascular system of the human body". London, 1819;] Joseph Adams (1756–1818) of London described cancer and other neoplasms, regarding them as perfect animals (parasites), and John Abernethy likewise occupied himself with the pathological anatomy of tumors in his "Surgical Observations" etc., 1804 and 1806. John Richard Farre, who wrote on "The morbid anatomy of the liver" etc., London 1812–1815, and William Cooke, one of the founders of the Hunterian Society, who translated Morgagni's "De sedibus et causis morborum" into English (1822), were of later date.

In Germany the new branch of medicine was cultivated by only a few. Among these were Reil, Sömmerring, who translated Baillie's work; F. G. Voigtel (died 1813), Physicus and "Bergarzt" in Eisleben, and author of the first German "Handbuch der pathol. Anatomie", with additions by Ph. Fr. Meckel, Halle, 1804–1815; Blumenbach; Conradi (Handbuch der pathologischen Anatomie, Hanover, 1796); Christian Friedr. Ludwig (1751–1823), professor in Leipzig (Grundriss der pathologischen Anatomie); the later A. W. Otto (1786–1845), professor in Breslau (Handbuch der path. Anatomie, 1814) and others.

General Anatomy

was founded by

Marie François Xavier Bichat (1771–1802),

a native of Thoirette in the Department of Ain, and the son of a physician. He began his studies in Nantes, and then applied himself to surgery and anatomy in Lyons, and to further studies in the department of surgery at Montpellier, especially under Antoine Petit. Subsequently he went to Paris and became there a member of Desault's family, his favorite pupil, friend and assistant. He clung to his master with the greatest affection and gratitude, and published Desault's works after his death. On the latter event he delivered lectures on surgery, and from 1797 forward gave private courses in anatomy. Bichat now developed a feverish and enormous scientific activity, and, besides his other labors, became the founder of the Société d'émulation. In 1801 he was appointed to the Hôtel-Dieu, but as early as 1802 — like the later Laennec, both creators of a new department of science — succumbed to the results of consumption and the effects of a fall, although in years the youngest of the memorable physicians of France. Through his wonderful mental fertility and power, and in spite of his early death, he had written in the few years of his life a great number of important works — they include nine volumes. In 1845 his remains were removed to Père Lachaise, and in 1857 he received a monument in the École de Médecine. As an evidence of Bichat's enormous activity it may be stated that in a single winter he examined 700 bodies. His chief works were the "Traité des membranes" (1800), "Anatomie générale" (1801) and anatomie pathologique" (published pothumously by Boisseau, 1826).

From Bichat's general and pathological anatomy a new tendency in medicine — that tendency which it manifests to-day — took its origin. Bichat's genius, masterly mental power and charming gracefulness of exposition, founded chiefly the realistic and pathologico-anatomical epoch. He uttered the famous apothegm "Take away some fevers and nervous troubles" — certainly important and in many respects decisive exceptions — "and all else belongs in the kingdom of pathological anatomy". He introduced the discrimination in detail of the processes of disease, or rather its products, and its definite localization not only in the organs, but also in their individual parts and tissues. Out of this there grew great advantages, indeed, so far as regards our knowledge of the morbid alterations, but, on the other hand, little benefit to our knowledge of the essence of the causative processes. To adduce but a single example: instead of the previous collective idea of peripneumonia appeared the division into pleuritis, pneumonia and bronchitis. — "You may observe diseases of the heart, lungs, abdominal viscera etc. night and morning by the sick-bed for twenty years, yet the whole furnishes merely a jumble of phenomena, which unite into nothing complete. But if you open only a few bodies, you will see the obscurity speedily give way, a result never accomplished by simple observation, if we do not know the seat of the disease". Next Bichat set forth and established the tendency of similar tissues to similar anatomical forms of disease:

> "As every tissue has everywhere a similar disposition, since, wherever it may be, it possesses the same structure, the same properties etc., so it is clear that its diseases must be everywhere the same. Whether the serous tissue belongs to the brain as the arachnoid, to the lungs as the pleura, to the heart as the pericardium, to the abdominal viscera as the peritoneum etc., it takes on inflammation everywhere in the same way, everywhere dropsies occur in the same way" etc.

This last division is connected with Bichat's creation of general anatomy. He distinguished general tissue-systems, found everywhere in the body, as e. g. cellular tissue, the nervous system of animal and organic life, the arterial system, the venous system, the system of exhalant vessels and lymphatics; and special tissue-systems, peculiar to certain parts exclusively, as e. g. the osseous, medullary, cartilaginous, fibrous and fibro-cartilaginous systems, the animal and vegetative muscular system, system of serous and mucous membranes, system of synovial membranes, glandular system, dermoid system, epidermoid system and the hairy system. These 21 tissues, selected without the aid of the microscope (which Bichat did not employ), were distinguished as simple and similar elements of the body, like the elements of chemistry, and like the cells which Virchow chose for his elements. They were assigned to general anatomy, while, on the other hand, descriptive anatomy had to do with their different combinations. Thus e. g. according to Bichat, the stomach, as the subject of descriptive anatomy, is composed of a serous, mucous and organic muscular coat. The simple membranes are the mucous, serous and fibrous; the compound membranes are formed by juxtaposition of these, and are called fibro-serous, sero-mucous and fibro-mucous, uniting in themselves one or more of the properties of the simple membranes.

Bichat overthrew the ontological and speculative tendency of medicine, placed "facts" in the front rank and banished ideas and "ideologists" (whom, like Napoleon, he sorely dreaded) from the science. Both these men furnish many general points of comparison; indeed, we might call Bichat, especially in view of his reputation and the wonder which his brilliant talents aroused, the Napoleon of medicine. "If I have gone forward so rapidly, the result has been that I have read little. Books are merely the memoranda of facts. But are such memoranda necessary in a science whose material is ever near us, where we have, so to speak, living books in the sick and the dead?" "Let us halt when we have arrived at the limits of the most careful and thorough observation, and let us not strive to press forward where experience cannot show us the way" — a sentiment which certainly does not accord with his earlier vitalistic views. Bichat was the first who claimed for medicine the rank of an "exact" science. "Medicine was long thrust forth from the bosom of the exact sciences. It will have the right to be associated with them, at least as regards the diagnosis of diseases, as soon as we shall everywhere have united with the most thorough and rigorous observation, the investigation of those changes which our organs suffer."

In the course of the further development of such views, and in consequence of the great sympathy extended to them everywhere, a new one-sidedness seized upon the medicine of our own century — a one-sidedness quite as great as the by-gone and partial idealism of the 18th century. This was the thoroughly realistic method, which gives to medicine the rank of one of the natural sciences, and finally goes so far as to desire to interpret and explain by pure realism even the mental characteristics.

7. STATE-MEDICINE (FORENSIC MEDICINE. MEDICAL POLICE.) PSYCHIATRY. HYGIENE.

State-medicine, particularly in Germany, gained considerably in the 18th century in cultivation and advancement.

Upon some subjects of this branch great light was thrown as early as the beginning of the century. Thus e. g. the fatal effects ascribed by Fr. Hoffmann to the fumes of charcoal (a case occurred to him in 1715) gave rise to an instructive discussion, into which was interwoven even a "religious element", the belief in the devil; for the partisans of the latter personage, much more numerous at that time than to-day, desired to claim or maintain for the swarthy master of hell's fumes the effects of even charcoal vapor.

On the other hand, J. H. Schulze and Ph. Ad. Böhmer studied into the necessity or superfluousness of ligation of the umbilical cord, and the former discussed the possible injuries to the health which might ensue from the use of metallic kitchen-utensils; Exupère Bertin, Heister, R. A. Vogel and others discussed the subject of prolonged gestation; finally Winslöw and Jac. Joh. Bruhier studied the signs of death.

Phil. Conr. Fabricius (1714–1774) of Butzbach in the Wetterau,

professor in Helmstädt, occupied himself with the docimasia pulmonum, and the same subject engaged the attention of the surgeon David Manchart.

Christoph Gottlieb Büttner,

professor in Königsberg, and above all of

W. Gottfried Ploucquet (1744–1814)

professor in Tübingen ("Nova docimasia pulmonum", 1782, Ploucquet's lung-test).

Other cultivators of the subjects of forensic medicine were:

Mich. Bernhard Valentin (1657–1729),

who, like the legislators and almost all the savants of his day, still believed in witches and magic ("Legal-medic. Pandekten");

Christ. Gottl. Ludwig (1709–1773),

who wrote some "Institutiones medicinæ forensis";

Christian Gottl. Tropanneger,

author of "Decisiones medico-forenses", 1733;

Wilhelm Heinr. Seb. Buchholz (1734–1798),

court-physician in Weimar;

Joh. Christian Traugott Schlegel (1746–1824),

ordinary physician of the prince of Waldenburg, a very fruitful writer (Collectio opusculorum selectorum ad medicinam forensem spectantium, Leipzig, 1783–1791), and

Chr. Fr. Daniel (1753–1798).

The following physicians were eminent as cultivators of the general department of state-medicine:

Joh. Zach. Platner (1694–1747),

who did not wish judges to decide alone in penal matters, but desired physicians also to be called in for the settlement of questions of sanity, a demand, which, when compared with the views of that day, must be regarded as reformative, and indeed revolutionary;

Herm. Fried. Teichmeyer (1685–1746),
a famous teacher ("Institutiones medicinæ legalis vel forensis");

Michael Alberti (1682–1757),
professor in Halle ("Systema jurisprudentiæ medicæ");

Chr. Ehrenfried Eschenbach (1712–1788),
professor in Rostock;

Joh. Dan. Metzger (1739–1805),
("Kurzgefasstes System der gerichtlichen Arzneiwissenschaft") a famous teacher of state-medicine in Königsberg, who, in conjunction with the already mentioned Platner, Unzer, Peter Frank and Osiander, bravely combated the superstition of demoniacal diseases and partially overthrew the belief in their existence;

Ernst Platner (1744–1818),
professor of medicine and philosophy in Leipzig;

Joh. Theod. Pyl (1749–1794),
professor in Berlin ("Magazin für die gerichtliche Arzneikunde" etc.);

K. Fr. Uden (died 1798),
who published some of the works of the physician last mentioned;

Hermann Delius (died 1791),
author of "Forensische Chemie".

In France the field of forensic medicine was eminently cultivated, among others, by Jean Jacques Bellocque; Claude Jos. Prevost (1672–1753), who wrote a treatise on forensic medicine for physicians, surgeons and midwives; Verdier (Jean), who wrote on medical and surgical jurisprudence. In Spain J. F. del Valle wrote on forensic surgery, and in England Samuel Farr (1741–1795) [of Taunton, author[1] of "The elements of medical jurisprudence", London, 1788,] discussed the subject of forensic medicine.

The earliest German text-book on medical police was written in Latin by

Joh. Wilh. Baumer (1719–1788),
professor in Erfurt and Giessen, under the title "Fundamenta politiæ medicæ", 1777. The subject of medical police was not, however, recognized as a "specialty" until the famous and highly-gifted

J. Peter Frank,
(in his noble "System der medicinischen Policey", 1779 1819) had introduced the official distinction of medical police and forensic medicine. This work of Frank's must likewise be considered the cornerstone of our modern public and private hygiene. Frank calls upon "the authorities" for aid in all matters, and thus became the champion of medical officialism. This was quite in accord with the spirit of the time, which strove to improve everything from top to bottom by the methods of an enlightened despotism, since the masses were still too illiberal and uneducated to be prepared for the proclamation of the gospel of self-help. Frank's book was written in German and in very good style for a medical work. It was designed for popular use in the best sense, and in this idea Frank anticipated the similar designs of Pettenkofer at the present day. Even in the commencement of his career Frank devoted his attention to the subject of medical police and had one volume of his work ready for publication as early as 1777. Unable, however, to find a publisher, he threw the volume into the fire, but soon wrote it over again, and two years later the first volume of his work was published in Mannheim by Schwan, the publisher of Schiller's

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[1] A translation of Joh. Fried. Fasel's "Elementa medicinæ forensis" (1767), with numerous additions by Farr. (H.)

"Robbers". The complete work embraced the science of health from generation to sepulture. The first volume was placed upon the Index because it spoke against celibacy, and accordingly in the second edition of this volume (1784) Frank remarked in the preface that he had not intended to attack the Church, and regretted having given offence, for he knew the power of the clergy. He, however, made no change in the contents of the work. He labored upon this work for his whole life, and it will remain a monument of his burning enthusiasm in the cause of the welfare of mankind. The book embraced the subject of school-hygiene (even the question of suitable benches), upon which he advanced very just principles. His efforts to increase the number of men are characteristic of the age, for as the result of the Thirty Years' War, after which many localities were deserted for miles, the destruction of men had been so great that in Nuremberg in 1650 bigamy was allowed in order to render assistance to the women. Frank was a practising physician when he began this work, which owes its origin to practice and its impotence — another proof that it is practical life, not mere book-learning, which gives birth to memorable works.

Among the emulators of Frank in the department of medical police must be mentioned the famous

E. Benj. Gottl. Hebenstreit (1758-1803) in Leipzig;

Zach. Gottl. von Huszty, Edler von Nassynya,
author of a "Discurs über die medicinische Polizei" (1786);

Joh. Chr. Friedr. Scherf (1750-1818),
physician-in ordinary in Detmold.

Among the new subjects of medical police since the 18th century are: regular inquests, which were first established in Austria; their result, morgues, instituted in France through the influence of Jos. Jac. de Gardanne (1781), and in Germany through that of Hufeland; institutions for the rescue of the drowned, established in France and Holland (1767), and in England in 1774 at the suggestion of the Humane Society[1] in London; the removal of cemeteries from the vicinity of churches, adopted in Prussia since 1798; and finally

INOCULATION.

The communication of natural small-pox to the healthy, in order to protect them from the natural disease, reaches back into hoary antiquity.

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[1] The foundation of the Humane Society in 1774 through the exertions of Heberden, William Hawes (1736-1808) and Cogan, was the occasion of a lively discussion in England of the subjects of asphyxia, drowning, apparent death etc., and of the immediate cause of death in such accidents. John Hunter proved that death in asphyxia was not due to apoplexy but simply to the want of air, and advised insufflation of the lungs and rectal injection of tobacco-smoke. In these views Cullen concurred. Prize essays on these subjects were presented to the Humane Society by Charles Kite (1788), Edmund Goodwyn (1789) and Anthony Fothergill (1795). Edward Coleman of London ascribed death in asphyxia to collapse of the lung and mechanical obstruction of the pulmonary vessels, for which he advised venesection (1791). Hawes in 1777 also wrote "An address to the public on premature death and premature interment", and Alex. Johnston (1716-1799) discussed (1775) the practicability of recovering persons apparently dead by drowning, suffocation etc. (H.)

The custom is mentioned among the Indians in the Atharva Veda. The operation was always performed by the Brahmins, who employed pus produced by those who had been inoculated with natural small-pox one year before, and also the pus of these secondary inoculations. They rubbed the place selected for operation — in girls the outside of the arm, in boys the outside of the forearm — with wool until red, scratched these places several times with knives for a space about an inch long, and laid upon them cotton soaked in variolous pus and moistened with water from the Ganges. Before inoculation a preparatory course of diet lasting for four weeks was considered necessary. The inoculation was performed in the open air, and the inoculated were required to remain out of bed and to sprinkle themselves morning and evening with cold water. If fever made its appearance the sprinkling was discontinued and the inoculated might at most stretch themselves before the threshold, and must eat sparingly. The Brahmins travelled about the country to perform inoculation, and the operation was practised in the beginning of Spring. Under the influence of such excellent hygienic regulations the results were for the most part favorable.

Among the Chinese the so-called "pock-sowing" was practised as early as B. C. 1000 by introducing into the nasal cavities of children, aged 3 to 6 years, a pledget of cotton saturated with variolous pus.

The Arabians had a "pox-sale". Pus from a patient suffering with small-pox was purchased for raisins and inoculated with needles.

The Circassians too, by means of needles, inoculated handsome girls upon the cheek, right wrist, left ankle, over the heart and navel, in order to preserve their beauty.

In the states of North Africa incisions were made between the thumb and index-finger; among the negros inoculation was performed in the nose, and in Denmark, Scotland, the Auvergne and other places, this operation was performed at an early period.

The employment of the inoculation of natural small-pox by the Greeks of Constantinople, where the custom had been long naturalized and practised by old women instructed in the art, exercised a most important influence upon the West. That the old women regarded the operation as a revelation of St. Mary did not impair its efficacy.

One of the first accounts of the inoculation of natural small-pox was given to the Royal Society in London in 1714 by Emanuel Timoni, a physician settled in Constantinople, and contemporaneously by Pilarini, the Venetian consul in Smyrna. The actual introduction of the practice into the West, however, was due chiefly to Marie Pierrepont Somerset, whose married title was Lady Mary Wortley Montagu (1690–1762), wife of the English embassador to the Porte, a lady of somewhat ambiguous conduct but of indisputable merit. In 1717 she had her son inoculated in Constantinople by her surgeon Maitland, and after her return to London in 1721 the operation was also performed upon her daughter, both children at the period of operation being six years old. These cases were followed by that of a son of Dr. Keith. In 1721 experiments were undertaken by Maitland upon criminals, and as these turned out favorably, the Prince of Wales and the royal princesses were inoculated by Mead. The practice was speedily adopted in America, France and Germany, and the enthusiasm was so great that numerous medals were struck and given to physicians for successful inoculation.

As inoculation became more general, of course some unfortunate cases could not be avoided, and a reaction thus took place. The clergy especially, with Bible in hand (like the late Dr. Nittinger[1] who died in Stuttgart in 1876, a warm opponent of vaccination), inveighed against this atrocious invasion of God's prerogative of punishment. When, however, in 1746 bishop Isaac Maddox of Worcester had recommended inoculation from the pulpit and established houses for inoculation, the operation became once more popular, and the famous Dr. T. Kirkpatrick in 1754 called it an evidence of God's goodness.

In Germany the first inoculations were performed by Maitland in Hanover, and the operation was especially favored by the physician-in-ordinary Hugo and by Werlhof, Hensler, Röderer, Tissot, Lentin, Hufeland and many others, while de Haën, who even raised the question "Is inoculation allowable in the sight of God?", of course opposed the operation zealously, and Triller wrote a poem against it.

In Paris some disputes arose over the inoculations undertaken there in 1760 by Angelo Gatti, professor in Pisa, an acute and accurate observer and a man experienced in experimental pathology. These were ultimately terminated in 1769 by the grant of permission to inoculate. Heretofore a medicus purus had first instituted a preparatory treatment of several weeks; a surgeon then performed inoculation, and the medicus again undertook the aftertreatment. Gatti combated this folly, and undertook the entire treatment alone. In Holland Theod. Tronchin (1709–1781) of Geneva had been active in the cause of inoculation at Amsterdam in 1748, and in Sweden David Schulz adopted the same course. In Austria the Belgian Joh. Ingenhousz (1730–1799) inoculated the archduke in 1768.

The practice of inoculation was most promoted by the two Suttons near London (Robert and Daniel), father and son, who in 1757 undertook it in genuine mercantile style. The former professed to have made 15,000 inoculations without a single fatal case. He kept the patient on strict diet for nine days, avoiding alcoholic drinks. Then he gave for three days nine grains of calomel, a single dose of one grain of cinnabar with one ounce of Glauber's salt, performed the inoculation with the smallest possible quantity of virus and very little scratching of the skin, administered five days thereafter four doses of Kermes mineral 9 gr., aloës 20 gr. and camphor 9 gr., and left the patients in the open air. [In 1784 the Suttons established a private hospital containing 24 beds solely for inoculated patients.] Besides the Suttons, Baron Thomas Dimsdale (1712–1800), of Thoydon Garnon in Essex, was a special promoter of inoculation and acquired through this operation great reputation and millions of money. In 1768 he inoculated for a large sum the heir-apparent to the throne of Russia. The operation was not prohibited in England until 1840, though it involved much greater dangers than

INOCULATION WITH COW-POX,

an operation which since 1874 has realized for German physicians only about 20 cents for each case, though in unfortunate cases — not so very rare, as thorough registration has proven — it involves some years imprisonment. In the grand-duchy of Hesse the physicians are permitted to demand about five cents in addition for a certificate of vaccination. This kind of inoculation was performed in 1774 by the farmer Benjamin Jesty of Gloucester, and next upon the children of the farmer Jensen by the schoolmaster Plett, at Starkendorf in Holstein, in 1792. But the pioneer in the extensive introduction of this method was

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[1] Heinrich Friedr. Germann (1820–1878), professor in Leipzig, in 1876 followed in his footsteps with a work in three volumes entitled "Historisch-kritische Studien uber den Stand der Impfrage". Other modern opponents in great numbers formed an "Antiimpfverein". The question is still under discussion.

Edward Jenner (1749–1823) of Berkeley in Gloucestershire, who is accordingly called justly the father of vaccination.

Jenner was the son of a clergyman and devoted himself to the study of surgery under the guidance of Mr. Ludlow in Sudbury near Bristol. During his term of apprenticeship he received from a milkmaid, who had had the cow-pox, information of the protective power of this disease against small-pox as established by popular observation.[1] The thought of the immense importance of such protection for the whole human race never after this time left his mind. In 1770 he went to London and became a pupil of John Hunter. To the latter he communicated his idea, and the great surgeon said to him "Don't think, investigate!" This he desired to do, and accordingly he went to Berkeley as a physician and surgeon, since material for his researches could be found in the farms of that vicinity. The observations made by him from 1778 forward he communicated in 1788 to Sir Everard Home but his first vaccination was performed in 1796 upon a boy named James Phipps with matter from the hand of Sarah Nelmes, who had contracted cow-pox in milking. In 1798 he published his results in his work "An inquiry into the causes and effects of the Variolæ vaccinæ" etc. The vaccine virus he preserved in the form of silk threads saturated therewith, and in this way he also sent it to others. Jenner lived for a long time in Cheltenham and afterwards in London, but died full of fame and honor in his native place, after having received in 1802 and 1807 rewards from the government amounting in all to £30,000, and having been made an honorary citizen of London. His attachment to J. Phipps induced him to build a house for the latter and to plant roses in his garden with his own hands. Jenner's life was written by his friend Dr. John Baron in 1827, and in 1857 a monument to his memory was erected in Trafalgar Square.

In Germany the first vaccination was performed by Hugo von Wreden in Hanover, which was then under English rule. In 1799 the surgeon Christian Friedrich Stromeyer (1761–1824), who had been educated in England, began to vaccinate on a larger scale, and he induced Dr. Georg Fr. Ballhorn (born 1761), the court physician, to translate Jenner's work into German. In 1800 both these physicians were able to report upon 1000 cases of vaccination.

At the same time with Stromeyer, Ferro was in 1799 the first to vaccinate in Austria, performing the operation upon his own children, and Dr. Jean de Carron (1770–1840) of Geneva, then in Vienna and subsequently in Carlsbad, operated in the same year.

Meanwhile societies for the promotion of vaccination, "Jennerian Societies", had been formed in England in 1799, and upon their model Heim established a similar society in Berlin in 1800. In the latter city Joh. Emm. Brenner (1745–1816), a simple practitioner, was very active in the diffusion of vaccination, while in Saxony Friedrich Wilh. Ludwig Hirt (born 1761) followed his example. In France vaccination was promoted by Pinel and Thouret in Paris; in Holland by Dr. Ludwig Heinr. Jos. Vrancken (1773–1853) of Antwerp; in Belgium by M. J. Demanet (1747–1831) of Ghent; in Italy by Aloysio Sacco, professor of medicine and surgery in Milan, and in Denmark by Heinrich Callisen (1740–1824). In Spain vaccination was diffused by Amar, Gil and Salva.

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[1] As early as 1765 Sutton and Fewster had determined that inoculation of persons infected with sheep-pox was ineffective. H. F. von Becker.

[The earliest vaccinations in the United States were performed by Dr. Benjamin Waterhouse (1754–1846), professor of the practice of medicine in Harvard College, upon four of his own children in July 1800. He procured his virus from Dr. Haygarth of Bath, England. During the same summer Dr. John Crawford of Baltimore also practised the operation with virus procured from Dr. John Ring of London (Quinan). Other early and eminent advocates and promoters of the practice were Dr. James Smith of Baltimore, Dr. James Jackson of Boston, Jefferson, Dr. Gantt of Washington, Dr. John Redman Coxe of Philadelphia, Dr. Seaman of New York, Dr. Ramsey of South Carolina etc. In 1802 Dr. James Smith organized in Baltimore the first Vaccine Institute in the United States, and in 1813 a United States Vaccine Agency was established by Congress under the direction of the same physician. This Agency was, however, discontinued in 1822.

"Animal vaccination", "Bovine vaccination", "Retro-vaccination", i. e. the transmission of humanized virus through the system of the cow and its subsequent employment in the inoculation of human beings, was first practised by Michele Troja (1747–1827) of Naples shortly after the introduction of human vaccination. In 1810, however, this practice was prohibited. "True animal vaccination", "true bovine vaccination" (Martin), i. e. the inoculation of human beings with the lymph derived mediately from a spontaneous case of cow-pox, is due to M. Negri, also of Naples, who practised it for several years prior to 1864. The practice was introduced into France by Depaul in 1866, into Belgium by Dr Warlomont in 1865 and into the United States by Dr. Henry A. Martin of Boston in September 1870. H.]

Compulsory vaccination was first introduced extensively in Germany[1] (Bavaria and the grand-duchy of Hesse 1807, Baden 1815, Würtemberg 1818; in the latter state revaccination of recruits was first introduced in 1829), and then in other countries. In England, however, compulsory vaccination was averted until the times of Albert, the Prince Consort, and it was first legalized in 1857 on the proposal of Dr. John Simon, medical officer of the Privy Council. In Germany, as we know, the strictness of the enforcement of vaccination has recently increased, and since 1873 revaccination (of recruits and scholars in their 12th year) has been also included. The rigidity of the law has, however, justly aroused strong opposition.

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[1] The temporary character of the protection of vaccination was first taught by Elsasser (1814) and von Stosch (1825). Schoenlein was the earliest to call attention to the distinction between variola and varioloid.

In the discussion of vaccination use was already made of

THE NUMERICAL METHOD.

The pioneer in the employment of this method was

Joh. Peter Sussmilch (1707–1777), member of the supreme consistorial court and a Fellow of the Academy of Sciences, who likewise procured the reception of Lessing into the latter society — an honorable monument of his own liberality of spirit. Sussmilch cultivated the numerical method in his work entitled "Nachweiss der gottlichen Ordnung in den Veränderungen des menschlichen Geschlechts unter Zuziehung der Geburts- und Sterbelisten", Berlin, 1741, while the famous

Gottfried Achenwall (1719–1772), professor of law and philosophy, must be regarded as the man who conferred the rank of a science upon Statistics. The latter are considered infallible in our medicine of the present day, although the investigations upon which they are based frequently manifest the faults of great inequality in themselves and lack of uniformity in their conditions.

THE TREATMENT OF THE INSANE.

during almost the whole of the 18th century, continued in a very bad condition, and it was not until toward the close of this period that a movement for its improvement made its appearance. At this time the lunatics began to be removed from the corners of hospitals and liberated from the prisons, fetters and the hands of brutal keepers, and to be looked upon by the profession as actual sick persons, belonging to the department of medical science and art. So-called "Schools" of psychiatry — French, German, English etc. — were founded.

In France the first impulse to this improvement was given by Anne Charles Lorry (1726–1783) in his work "De melancholia et morbis melancholicis", which appeared in 1765. He was followed by the true Reformer of the Treatment of the Insane,

PHILIPPE PINEL (1755–1826),

whose work "Traité médico-philosophique sur l'aliénation mentale, ou la Manie", Paris, 1801, marked an epoch in the department of psychiatry.

Pinel removed from the insane their fetters, did away with corporeal punishments and abuse, limited the employment of drugs and especially of venesection, separated the insane from convicts, taught that mental diseases should be looked upon as corporeal lesions, placed the insane in hospitals under the charge of physicians, and in these hospitals classified the patients according to the character of their diseases, and inculcated the necessity of their treatment by gentle means and by physical labor. Yet in spite of Pinel's humane teachings lunatics were found in cages in some of the French provincial cities as late as 1833 and 1834.—Pinel's footsteps were followed by

JEAN ÉTIENNE DOMINIQUE ESQUIROL (1772–1840),

who in 1817 established a clinic for mental diseases.

Among the Italians

Vincenzio Chiarugi (1759–1822) of Florence, was chiefly active in exciting new efforts in this department. He regarded the mind as something immaterial, and therefore incapable of disease in the ordinary sense of that term.

The English displayed special activity in this department. Thus

Cullen and his pupil Thomas Arnold (died 1816) of Leicester, as well as William Perfect (born 1740), studied the subject of mental diseases. The latter believed them to be disturbances of the bodily functions, and based his indications upon this idea, a system in which he was followed by almost all English alienists. Sir Alexander Crichton (1763-1856) distinguished mental disturbances arising from the passions from those depending upon corporeal causes, and also brought forward heredity as one of the causes of insanity. William Pargeter of Reading ("Observations on maniacal disorders", London, 1792) laid the chief importance in practice upon the character of the physician and his ascendency over the insane. John Haslam (1764–1844) of London devoted his attention to pathological anatomy as related to mental diseases, and William Tuke (1732-1822) of York, founder in 1793 of the York Retreat for the Insane, introduced into England the psychical treatment of lunatics. [The grandson of the latter, Samuel Tuke, though not a physician, wrote a description of the York institution in 1813, and his great grandson Daniel Hack Tuke (born 1820), likewise medical officer to the York Retreat, is one of the most eminent of English authors on the subject of mental diseases. The Tuke family were all Quakers.

Andrew Marshall (1742-1813), an army surgeon and anatomical lecturer in London, discussed the morbid anatomy of mania and hydrophobia, and referred both diseases to lesions of the brain, particularly of its vascular apparatus; and Joseph Mason Cox (1762–1822) ascribed mental diseases chiefly to cerebral hyperæmia, recommending in their treatment cathartics, cold lotions and baths and the use of the swing.

James Monro (died 1752) and his son John (1715–1791), both physicians to the Bridewell and Bethlehem Hospital; Wm. Battie (1704–1776), physician to St. Luke's Hospital and proprietor of a private asylum in London; John Ferriar (1763–1815) of Manchester and John Johnstone (1768-1836) of Birmingham, were likewise eminent alienists. H.]

Among the Germans

Joh. Ernst Greding (1718-1775), physician to the poor-house in Waldheim, was the earliest to investigate the seat, cause and diagnosis of insanity. After him Weikard divided mental disturbances into those of the intellectual and those of the emotional sphere, while Joh. Benj. Ehrhard (1766-1827), whose memory is preserved in the biography of the physician Varnhagen of Ense, distinguished insanity from melancholia, hypochondria, folly, delirium etc., and studied the doctrine of fixed ideas. The noble

JOH. GOTTFRIED LANGERMANN (1768–1832)

must, however, be regarded as the reformer of psychiatry in Germany. He was the first who placed the curable and incurable in distinct institutions, and he divided diseases of the mind into idiopathic and symptomatic. Langermann was the son of a peasant in Maxen, near Dresden, and owed his opportunities for study to the favor of patrons of rank. He first graduated in law before devoting himself to the study of medicine in Jena 1794–97. Even his thesis for graduation was devoted to the subject of mental disorders, and bore the title "De methodo cognoscendi curandique animi morbos stabilienda", emphasizing the importance of the improvement of lunatic asylums. He was appointed physician to the St. George asylum near Beyreuth, and raised this institution to the position of a model asylum. Finally he was appointed state-counsellor and supreme medical-counsellor in Berlin.

Besides Langermann, Reil and Joh. Chr. Hoffbauer (1766–1827) in Halle, about the close of the 18th century, made special efforts to bring psychology into accord with physiology in the department of alienistic science.

PRIVATE HYGIENE

in the 18th century found abundant cultivation, partly in works of thoroughly scientific character, partly in popular writings.

What we at the present day understand by the term "private hygiene" in earlier times passed under the name of dietetics. Hence this branch is as old as medicine itself. The Indian physicians, like the Greek gymnasts and philosophers and the physicians from Hippocrates to Galen, were distinguished for their attention to this department of medicine, and it was cultivated at a very early period too by the laity. Among the latter we may mention Plutarch (born A. D. 70, "De tuenda sanitate"), Athenæus (born A. D. 220) in Alexandria, who in his "Deipnosophistæ", and Cælius Apicius in his "De re culinaria", discusses especially the preparation of articles of food. The Arabians too, and particularly the Salernian physicians, whose popular poem excited much attention and awakened numerous imitations, cultivated this branch of medicine. Physicians of the later Middle Ages, like Despars, Hugo Bentius (died 1448), Ficinus and many others composed numerous writings on hygienic subjects; indeed as early as 1483 Mich. Schrick discussed "die uszgepranten Wasser" from a sanitary stand-point. At this period the drinking of distilled liquor began. With the commencement of the modern era the number of writers on hygienic subjects increased in all lands. Of this large number we mention only: Sir Thomas Elyot, author of "The Castell of Health", 1534; Luis Lobera d'Avila, 1542; Andr. Lacuna (1499-1560), victus ratio; Thom. Philologus (born 1493), author of "De vita hominis ultra centum viginti annos producenda", Venice, 1550; Luigi Cornaro (died 1566), "Discorsi della vita sobria"; Rud. Goclenius (1572-1621) and Mart. Pansa (born 1580), "De proroganda vita liber aureus". After Sanctorius the following writers distinguished themselves as authors on the subject of hygiene: Bacon and Thomas Venner (died 1660; "Guide to long life") in England; Melch. Sebiz Jr. (1578-1674), "De alimentorum facultatibus"; Phil. Jac. Sachs von Lewenheimb (1627-1671), author of a treatise on grapes; Sim. Paulli (1603-1689) in Copenhagen, who wrote on the abuse of tobacco in Germany. Joh. Domin. Sala (1579-1644), who wrote on food; Dom. Panaroli (died 1657), on various fruits; Valentin Heinr. Vogler (1622-1677), on dietetics in general; J. Sigismund Elsholz (1623-1688), author of a "Tischbuch"; Ehrenfried Walther Tschirnhausen (1651-1708) mathematician, physicist and logician, author of a medicine of the mind; J. Gottfr. von Berger (1659-1736), "De tuenda valetudine ex cognitione sui ipsius", 1707; John Sinclair, "Handbook of health and long life", edited by Sprengel. A book bearing the now usual title of "Hygiene" or "Idea hygieines recensita" (1661) had for its author John Johnston, a Scotch savant and physician.

During the 18th century the most distinguished physicians promoted prominently the subject of hygiene. The earliest to make their appearance were the famous Hoffmann, with an "Anweisung wie ein Mensch etc. sich verwahren könne" (1715), and the follower of Stahl, J. Samuel Carl, with a "Diätordnung für Gesunde und Kranke", while Cheyne wrote "An essay of health and long life", 1724, J. Arbuthnot (1658-1735) an "Essay concerning the nature and choice of aliments", 1731, and the famous Neumann on tea, coffee and beer. William Cadogan composed a work "On the nursing and management of children from their birth to three years of age", 1748, and C. G. Löber an "Anleitung zu einer heilsamen Lebensart und Gebrauch der Speisen": comprehensive works were supplied by the Berlin physician J. F. Zückert, who wrote a general treatise on foods, in 1775; N. Boerner (medicus sui ipsius, 1774); William Falconer of Bath ("Remarks on the influence of climate" etc., 1781); Bassiano Carminati (Giac. Sacchi; "Hygiene, terapeutice et materia medica" Pavia 1791–95), and Ludwig Vogel (lexicon of dietetics). Wilhelm Josephi expatiated upon marriage and physical training (1788). The most famous works upon the subject of hygiene, however, written in popular style were the "medicinischen Fastenpredigten" of Fr. Ant. May (1743–1814) of Heidelberg, who also delivered lectures for boys and girls above ten years of age, with the object of promoting hygiene. It should be also remarked, by the way, that May possessed that rare love of the truth which led him to discuss with the students his own mistakes at the bedside. Other famous hygienic writings were the journal "der Arzt" of Unzer, the "Avis au peuple" of Tissot and the "Makrobiotik, oder die Kunst, das menschliche Leben zu verlängern" of Hufeland, new editions of which appear even at the present day.

[To the catalogue of English writers upon the subject of private hygiene we may add: Francis Fuller, author of a very popular "Medicina gymnastica" (1704); Edward Baynard of Bath, whose poem "Health" (1719) survived numerous editions; James Mackensie, who wrote in his old age a history of hygiene (1759); Andrew Harper (1789); George Wallis (1793); the famous Thos. Beddoes of Bristol (Hygiëa etc., 1802), and James Parkinson (1799), best known as the earliest describer of paralysis agitans in 1817. H.]

What we to-day call

Public Hygiene.

was created by Joh. Peter Frank under the title of "Medical Police".

[We may add here that the subject of military hygiene was discussed, among others in England, by: Richard Brocklesby (1724–1797), whose experience in the Seven Years' War led him to recommend light, wooden shelters for the protection of the sick and wounded in the field; Donald Monro (1780) and William Blair (1798). — Hospital hygiene was also studied by James Carmichael Smyth (1741–1821), whose experiments in the disinfecting power of nitrous acid fumes proved so successful that Parliament rewarded him with a present of £5,000, and he was soon after appointed physician extraordinary to the king. Sir William Blizard also wrote in 1796 "Suggestions for the improvement of hospitals and other charitable institutions". H.]

From all that has been said it is clear that in the last century hygienic questions were treated with considerably greater predilection than has been until recently the case in our own age. Hygiene, however, at that period was devoted more to the claims of general and everyday life, and less to the hygienic regulations against epidemic diseases, than is the case to-day.

8. VETERINARY MEDICINE. PHARMACOLOGY AND PHARMACY.

Veterinary medicine during the 18th century began to assume the rank of a science. Several circumstances conspired to produce this result. Chief among these was the necessity of supplying the armies with better educated veterinarians. Then too the great animal epidemics of the 18th century, so injurious to the common weal — in Holland alone 60,000 cattle are said to have perished — startled the states out of the indifference with regard to veterinary medicine of which they had heretofore been guilty. Finally the extensive investigations in the department of zoology, undertaken by such men as Buffon, Daubenton, Cuvier, Vicq d'Azyr and others, excited a lively interest in veterinary medicine also. Even eminent physicians devoted attention to the subjects of this science, among them e. g. Ramazzini, Camper, Haller, Sauvages, Joh. Gottlieb Wolstein (1738–1820) etc. Special veterinary schools were now founded, the first in 1762 at Lyons, the second at Alfort near Charenton, in 1763. Thus it came about at last that better care was taken of horses than of lunatics.

In France during this century also equerries of noble birth and ex-farriers chiefly devoted attention to the department of hippology. Among these we may mention:

Gasp. de Saulnier

("Parfaite connaissance des chevaux", 1734), who collected old recipes and invented, among others, four recipes, each containing a score or more of ingredients;

De la Chaynaie,

("Parfait cocher", 1744), who studied the diseases of horses and gave remedies of easy preparation;

F. R. de la Guerinière,

("École de cavalerie", etc., 1754), who strove after simpler prescriptions than his predecessors;

De Garsault

("Nouveau parfait maréchal", 1755, often reprinted), who, besides the pathology of horses, furnished a hippo-pharmacognosy with plates, and a hippo-pharmacodynamics. We should also notice

Louis Vitet (1736–1809),

a veterinarian of Lyons, who wrote a "Médecine vétérinaire" (1783), and introduced the experimental method into veterinary medicine.

A lawyer, who began to study the veterinary art because his conscience revolted against the practice of law, as that of Thaer did against the practice of medicine, became of the greatest importance in the development of veterinary medicine. This was

Claude Bourgelat (1712–1779) of Lyons,

whose name "will ever remain a subject of admiration and respect to all veterinary physicians" (Isensee). Under the auspices of the minister Bertin he occasioned the foundation of both the veterinary schools mentioned above, and he was also a teacher in them. Bourgelat was a follower of Boerhaave. He wrote some comprehensive works: "Élémens de l'art vétérinaire"; "Élémens d'hippiatrique" etc., 3 vols.; "Matiére médicale raisonnée" etc.

Contemporary with, and after, him the two

De Lafosse

distinguished themselves. The father Étienne Guillaume, was first a farrier, but became finally royal veterinary physician. His son and successor in the latter position, Philippe Étienne (1739–1820), first studied medicine and surgery and became finally general inspector of all the veterinary schools. He continued his father's "Cours d'hippiatrique" and himself published a "Dictionnaire d'hippologie".

Bourgelat's successor in 1779 in the school at Alfort was the earlier farrier

CHABERT (Oleum Chaberti),

who furnished rare evidence of his insight by inviting to the school scientific physicians like Gilbert (died 1799), Girard, Huzard and Flandrin, to be his subordinates.

The respect for veterinary physicians during the present century has become so high that Henri Bouley (1814–1885), who wrote on the epidemic diseases of animals, particularly the cattle-plague, died a director of the Academie.

[In England the eminent animal painter

GEORGE STUBBS (1724–1806) of Liverpool

wrote "On the Anatomy of the Horse" (1766), and about the same period

MR. GIBSON,

a surgeon of cavalry, published a "Farrier's guide";

DAN. P. LAYARD (died 1802) of London

wrote "An essay on the nature causes and cure of the contagious distemper among the horned cattle" (1757), and

MR. BARTLET,

a "Pharmacopœia hippiatrica" and "Gentleman's Farriery" (1759). The eminent Anglo-French microscopist

JOHN TUBERVILLE NEEDHAM

also published in 1770 a "Mémoire sur la maladie contagieuse des bêtes à cornes". — The earliest veterinary school founded in England, however, was the London Veterinary College, established in 1791 through the exertions of Chas. Vial de St. Bel, an alumnus of the school of Lyons, who had as his assistant Delabere Blaine. St Bel died in 1793 and was succeeded in the presidency of the school by Mr. Coleman, who conducted the institution with eminent success. Lectures on veterinary medicine were delivered by Mr. Dick in Edinburgh as early as 1819, but a regular college was not established until 1823, when Mr. Dick organized and conducted the Edinburgh Veterinary College. Mr. Dick died in 1866, leaving the college, his museum and his private fortune to the city of Edinburgh. He had associated with himself in the administration of the institution Mr. John Barlow and Dr. George Wilson. A New Veterinary College was organized in Edinburgh in 1857 by Mr. John Gamgee, who continued to conduct it until his removal to London in 1865. A veterinary school was also founded in Glasgow in 1861 under the auspices of Mr. James Macall. The "Royal College of Veterinary Surgeons", composed of alumni of the Colleges of London and Edinburgh, was chartered in 1844. — In the United States charters for veterinary colleges were granted in Pennsylvania in 1853 and again in 1866, but in neither case did the efforts at organization prove successful. In 1855 George H. Dadd secured a charter also for the Boston Veterinary Institute from the state of Massachusetts, but again the effort resulted in failure. Dr. John Busteed, however, procured a charter from the Legislature of New York in 1857 and succeeded in organizing the N. Y. College of Veterinary Surgeons, which continued to impart vetérinary instruction with considerable success for about ten years, when, owing to internal dissensions, it was compelled to suspend. In 1875, however, it was reorganized as the American Veterinary College, which now enjoys a successful career. Veterinary instruction is also imparted in the Massachusetts Agricultural College and in Cornell University.

Among the earlier English veterinarians and veterinary authors were Boardman (1805), J. Clark (1785), Peale (1814), White (1815), B. Clark (1815) and William Youatt (1777–1847). H.]

In Sweden

Friedrich Hastfer (1756)

took the lanigerous animals, their perfection and improvement, for the subject of an essay.

In Denmark a noble veterinary school was founded in 1773 by the famous

Peter Christ. Abildgaard (1740–1801)

in Copenhagen, and his successor,

Erich Nilsen Viborg (1759–1822)

rendered good service to the subject of medicine by his investigations relative to cow-pox.

In Germany among the earliest cultivators of veterinary medicine belonged

Johann Christ. Polyc. Erxleben[1] (1744–1777),

professor in Gottingen ("Einleitung in die Vieharzneikunde"; "Praktischer Unterricht in de Vieharzneikunde", and a translation of Vitet);

Joh. Jos. Kausch (1771–1825),

government and medical counsellor in Liegnitz, and

J. Paul Adami in Vienna,

royal "Contagionsphysikus".

A new era for veterinary medicine in German lands began when Joseph II. in 1777 founded in Vienna the institute for the education of military veterinarians and farriers, after

Scotti in the year 1769 had made a beginning of this work.

J. G. Wollstein

specially combated the abuse of bleeding in veterinary medicine. He was followed by

Dr. J. J. Pessina (died 1808).

Subsequently (1817),

Dr. Joh. Emanuel Veith (1787–1876; "Handbuch der Veterinärkunde"),

originally a Jew, but from 1821 honorary canon and preacher of the cathedral at Vienna, a famous pulpit orator, homiletic writer and poet, was an active veterinarian. The same is true of his brother

Dr. Joh. Elias Veith (1789–1885).

The latter in 1823 was appointed professor of surgery in the veterinary institute, and was pensioned in 1855, becoming a very popular practitioner. He republished the book of his brother, and wrote himself on forensic veterinary medicine.

Veterinary schools were established in Hanover in 1778, Munich in Bavaria 1790, and Wurzburg in 1791.

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[1] He was the son of Dorothea Christine Erxleben, daughter of the physician Polycarp Leporin, and a regularly graduated "doctress" (Halle 1754) who practised with good fortune and skill in Quedlinburg until her death in 1762. Besides her, Laura Bassi is said to have graduated in Bologna in 1731. Doctresses of medicine, at that period quite rare, are become so common at the close of the 19th century that many a professor is able to select a consort of his own rank. In Bologna in 1885 Dr. Giuseppina Cattani was even the female professor of anatomy, and Dr. Margherita Farne, female physician-in-ordinary to the queen of Italy. Antonia Elizabetha von Held (born 1729), whose (second) husband was Müller of Frankfort, was an ungraduated "Specialist" in syphilis.

Model institutions of this kind were founded at Berlin in 1790 for the state of Prussia, at the instance of

Christian Andreas Cothenius (1708–1789),

ordinary physician of Frederick the Great. The professors to be appointed to these schools were required to pursue a course of study at one of the institutions already existing. J. G. Naumann studied in Paris, G. F. Sick in Vienna and the later veterinary apothecary, Ratzeburg, in Leipzig. The institution possessed a clinic for animals, arrangements for keeping them in the open air, cold and warm baths, isolated stalls for cases of glanders, its own house for dissection, a smithy etc. Free foundations for students from civil life were established, in order to open the way for improvement in private veterinary medicine.

J. G. Langermann

too, the alienist already mentioned, did not scorn to occupy himself with the improvement of veterinary art.

Joh. Nic. Rohlwes (1755–1823: "Das Ganze der Thierheilkunde") and

Chr. Ehrenfried Seiffert of Tennecker (1770–1839),

also belonged to the 18th century.

Journals likewise provided for the extension of better knowledge in this branch. In

Pharmacology

Ludovici's method of discarding the antiquated and useless was not imitated, and it thus resulted that throughout the whole 18th century an incredible number of strange remedies like mummy, millepeds, wood-lice, various sorts of dung and the like, were regarded as efficacious. Indeed amulets were still found in the shops. Instead of simplifying the materia medica, not a few new drugs were added to the already superabundant store, and numerous erudite battles were fought over the old and new remedies, just as at the present day. This unwearied search after remedies and methods for the cure of disease is ever the portion of physicians; while the full possession of absolute power to cure even the most trifling diseases will — and must — ever remain denied them. Special services were rendered to pharmacology by Francesco Torti (1658–1741), Joh. Reinhold Spielmann (1722–1783), professor in Strassburg, whose successor in 1784, Joh. Hermann of Barr, was the founder of the cabinet of natural curiosities in that city, and by Johann Andr. von Murray (1740–1791) of Stockholm, professor in Göttingen, author of an "Apparatus medicaminum" in six volumes.

Torti and Werlhof, with John Fothergill, Ludwig Chr. Althof (1758–1832), a professor in Gottingen and a friend of Burger, Johann Heinrich Rahn (1749–1812) in Zurich ("Pfalzgraf"), and many others, were forced to struggle continually to establish the advantages of the cinchona bark. Their most weighty opponents were Eller, ordinary-physician in Berlin, and Sénac. Opium suffered the same experience. There was also much dispute regarding the advantages of ipecacuanha. The combination of these latter drugs, under the form of the so-called Dover's powder, was introduced about 1760 by Richard Brocklesby. A number of narcotic drugs like conium, stramonium, pulsatilla, clematis, hyoscyamus, colchicum and others were investigated by Stoerck (1760) and recommended for use, while the aqua laurocerasi was investigated by William Baylies (died 1767), and the oleum amygdalæ amaræ by Martin Poli (died 1714) in Rome. Digitalis was administered in dropsy by Charles Darwin (died 1778; son of Erasmus Darwin), though the attention of the profession was first prominently directed to the duretic and cardiac activity of this drug by Wm. Withering (1741-1799) of Birmingham (1785). Catechu and kino (Fothergill), colombo (Gaub), quassia (Daniel Rolander), viola tricolor (Karl Strack), and senega (Dr. John Tennent of Virginia, 1736) appeared as new remedies. Acorns were recommended by Friedr. Wilh. Jos. Schröder, professor in Marburg (1774), and by Marcus Joseph Marx (1776). The internal use of tar in diseases of the skin and in gout was extolled by bishop George Berkeley (1684-1753), and the oil of turpentine with sulphuric ether for gall-stones by Jean Fr. Durande (died 1791) in 1770. Arsenic in solution — the aqua Toffana, so named after Toffa, a female poisoner executed at Naples in 1709, was such a solution — was prepared by Thomas Fowler (1736-1801) and employed (after the example of Dioscorides, Cælius Aurelianus and the Arabians Marx) by Slevogt (1700), Fowler (1786), Adair (1784) and others. Sulphuric ether with alcohol was introduced by Hoffmann, the opodeldoc[1] of the English by Dr. Steer, the employment of cooking salt in hæmoptysis (common among the Ancients) was revived by Chr. Fr. Michaelis, acetate of lead was introduced by Goulard (1760), corrosive sublimate by van Swieten and Sanchez and mercurius solubilis by Hahnemann. Nitrate of silver was recommended in epilepsy, phosphorus (Mentz in Langensalza) and phosphoric acid (Lentin) inorganic acids (especially muriatic and nitric, even for syphilis). Alkalis and alkaline earths were better tested, oxygen and carbonic acid were likewise employed as remedies by inhalation. Gastric juice was employed externally for ulcers etc. etc.

Three remedies, or rather three therapeutic methods, require to be more carefully considered, since two of them during the 18th century began to be methodically and generally employed and scientifically studied, and the third was revived in a new form.

We have already stated that the Ancients, from the days of the Asclepiadæ, employed the waters of healing springs, i. e. mineral waters, though not frequently — Archigenes had the patient drink as much as fifteen pints for the relief of stone. Indeed waters were even classified according to their constituents as alum-waters, sulphur-waters, chalybeate waters, bituminous waters etc. We have also seen that the Italian physicians of the last half of the Middle Ages prescribed these waters, and Giac. de Dondi e. g. did a notable business in the salts obtained by evaporation from the waters of Abano. At a later period mineral waters were drunk still more frequently, indeed in considerable quantities, for at that time, even more than to-day, the excellence and efficacy of the water was judged by its strength, particularly its cathartic effects. Paracelsus exercised a great influence upon the theory and employment of mineral springs (particularly those of Pfeffers, Gastein etc.), and it is one of his chief services that he subjected the learned medicine of his day (which thought itself safe only in guilds and study-rooms) to the test of living observation and actual life, and employed chemistry in medicine, particularly also as it related to the question of mineral springs. As the science of chemistry itself was improved, the subject of mineral waters likewise enjoyed increasing attention. Thus in the 16th

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1. "Oppodeltoch" is the original orthography of Paracelsus, from whom we have inherited the term. He employed it to represent a plaster, and the "Opodeldoc" of the B. P. was of a soft, semi-solid consistence, the Linimentum Saponis Camphoratum of the U. S. Pharm. (1850). (H.)

century Joh. Bauhin (1543–1613), professor in Basel, and Andr. Baccius in France, occupied themselves, among others, with this subject. In the 17th century, so devoted to the natural sciences and so extraordinarily inquisitive, many persons devoted themselves to investigations relative to mineral waters, as e. g. van Helmont, Libavius, Boyle, Lister, Robert Pierce (1690), Urban Hjarne (1641–1724) of Stockholm, Duclos and Bourdelin, who in 1670 investigated the French mineral waters etc. The states too began to meet the abuses which had crept into the baths by ordinances for their regulation, for governments generally, during the 16th and 17th centuries, began to interfere, in a manner which to us of the present day seems too severe and strict, against the immorality and insubordination, the debauchery, dissipation etc. which originated in the Middle Ages and the Thirty Years' War.

The pioneer and chief promoter of the study of the mineral waters, and the physician whose influence was longest felt in this subject, was Friedrich Hoffmann, who from the outset of his career, at the instigation of Boyle, turned his attention to their analysis and uses. At least as early as 1684 he wrote on the healing springs of Herrnhausen in the principality of Halberstadt.

Hoffmann gave prescriptions for the use of mineral waters, even taught how they could be imitated artificially, and analyzed many German springs, coming finally to the conclusion that solid constituents, such as lime, magnesia etc., in the form of an alkali and carbonic acid, existed in almost all mineral springs. He himself examined the waters of Aix-la-Chapelle, Bibra, Carlsbad, Lauchstadt, Pyrmont, Seydlitz (its salt he highly recommended), Selters, Schwalbach, Spaa, Teplitz and Wiesbaden. The fabulous "Brunnengeister", however, still played a part during the whole century, although by the aid of chemistry a more tangible form for these imponderable agents was facilitated.

Stahl opposed the general employment of mineral waters recommended by Hoffmann, though he did not question their utility in certain cases. ("Untersuchung der übel kurirten and verderbten Krankheiten", Leipzig, 1726.)

Torbern Bergmann, (1735–1784),
who was the first to lay down the doctrine of double elective affinity in 1775, devoted his attention to the mineral waters of Sweden and Denmark, and also taught the artificial preparation of warm and cold mineral waters.

Cranz made numerous examinations of the mineral waters of Austria, while the Berlin physician Joh. Friedr. Zückert (1768) wrote on those of Germany. The springs of England were studied by John Elliot (1747–1787), author of "An account of the nature and medicinal virtues of the principal mineral waters in Great Britain and Ireland" etc., London, 1781, and Donald Monro (1729–1792) in his "Treatise on mineral waters", 1770. [Benjamin Allen (1700), Ed. Baynard (Bath, 1702), Wm. Oliver (Bath, 1707), Thos. Short (Scarborough, 1734), Wm. Hillary (Lincomb, 1743), Peter Shaw (Scarborough, 1756), Chas. Lucas (Bath etc., 1764), Dale Ingram (Epsom, 1768), Jas. Johnstone (Welton, 1787), John Ash (Spaa etc., 1788), John Nott (1793), Robert Graves (1792), John Rutty (1757) and numerous others also discussed the various mineral waters of England and the Continent.] The mineral springs of France were investigated by Jos. Barth. Franç. Carrère, Beru, Peyrilhe and others.

Sea-baths were recommended in Germany by S. G. Vogel (1794), [and in England treatises on sea-bathing were written by Thomas Reid (1795), a physician of Bath, and Alex. Peter Buchan of London (1801).]

The first resort for sea-bathing established in Germany was that of Doberan in 1794. This was followed by Norderney in 1797 and Travemünde in 1800.

The use of ordinary water as a remedial drink and in the form of (cold and tepid) lavations and baths for the cure of diseases, especially those of a febrile character, first made its way into German practice in the 18th century, though it had been in use among other nations at an earlier period.

Even Hippocrates permitted baths in febrile diseases, though rather tepid baths than cold. He was particularly fond of these in pneumonia, to mitigate the pain and facilitate expectoration and respiration. We know too that Musa cured the emperor Augustus by means of cold baths, after warm baths had failed to produce any benefit. Asclepiades, Charmis of Marseilles, Agathinus, Herodotus, Celsus, Aretaeus, Ætius and others, likewise employed cold water, most frequently in the form of affusions in the case of epileptics and lethargic patients, and as lavations and cold dressings upon the head in typhus. Galen, like Hippocrates, was no great friend of cold lavations and baths, though he employed the former in the fevers of young people, excluding hectic fever.– Among the Arabians Rhazes recommended cold lavation and dipping in cold water in cases of small-pox and measles. Avicenna followed Galen, and regulated his employment of cold in accordance with the age, constitution and season of the year.[1]

Michael Savonarala (1424), who was likewise a writer on balneology, was the first to recommend the douche. He was followed by Mengo Bianchelli, Christoforo Barzizi (1450), Cardanus and others. Paracelsus had his hydrophobic patients dipped in cold water, in order to rid them of their aversion to it! Lud. Settala introduced cold affusions. After him the drinking of cold water was recommended by Agostino Magliari and Rovida in Naples, while Fra Bernardo Maria de Castrogiane (Fra Bernardo) gave cold enemata. Cold water baths were adopted in treatment by Giac. Todaro (the medicus per aquam), Nic. Crescenzo (1727) in Naples at the beginning of the 18th century, and subsequently by Mich. Sarcone and Nic. Cirillo, professor in Naples in 1732, and others. — In England Sir John Floyer recommended the use of cold baths in his "Psychrolusia", 1702, a work which refers the origin of the watercure system to baptism, and finds the cause of rachitis in the fact that children in baptism were no longer plunged into the water in pious England but simply had their heads wet.[2] This book survived numerous editions. After Floyer, George Cheyne (1671–1748) and Mead praised cold water, the latter employing plunge-baths in the treatment of the insane. Smith (1721) employed cold water to strengthen the constitution of even small children, while John Hancock, a clergyman, in his "Febrifugum magnum, or common water the best cure for fevers", London, 1723, recommended it in measles and all febrile diseases. Subsequently the subject of the water-cure was discussed by William Buchan (1729–1805), William Wright (1735–1819) in Barbadoes (at the instance of Currie), Robert Jackson (1798), Joseph Brandreth (1791) and Chas. MacLean (1797).

In Germany the drinking of cold water and the use of cold baths was recommended by Friedrich Hoffmann in 1712,

"in order to restore to the solid parts, both external and internal, e. g. the stomach, their fresh and elastic motility".

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1. Even the American Indians dip patients suffering from yellow fever into cold water.
2. Floyer's work was originally entitled "An inquiry into the right use of the hot, cold and temperate baths in England", and appeared at London in 1697. It was republished in 1702 under the title "Ancient Psychrolusy revived". (H.)

The proper cold-water epoch of the 18th century began, however, with the "Unterricht von der wunderbaren Heilkraft des frischen Wassers" (1770) of the Silesian physician Joh. Siegismund Hahn (1696–1773), son of the Dr. Siegismund Hahn (1664–1742) in Schweidnitz, who already employed cold water.

Dr. J. S. Hahn recommended cold lavations in febrile diseases, scarlet fever, erysipelas, small-pox etc. Cold lavations he called the "kleine Gerathschaft"; sitz-baths in tubs of cold water, the "grosse Geräthschaft", and the complete cold bath, the "grösste Geräthschaft". — Gottfried Hahn, the brother of J. S. Hahn, was likewise a representative of cold-water therapeutics in febrile diseases, a system recently revived by Ernst Brand in Stettin (Die Hydrotherapie des Typhus, 1861).

The modern method of employing cold water, i. e. that method which takes into consideration the amount of heat abstracted, was first employed in England (1797) by

James Currie (1756–1805),

a physician of Liverpool, who had been originally a merchant in America. He employed cold affusions in all acute diseases, but particularly in typhus, in which disease he regarded them as the most efficacious remedy, as we do again at the present day. He preferred sea-water or water mixed with vinegar, and proceeded as follows: a stream of water from a large vessel was poured over the naked patient; the higher the temperature of the patient as *determined by the thermometer*, the colder was the water and the more frequent the affusions. Even in acute diseases like scarlet fever with diphtheria, measles, in inoculations etc., he employed his method. [Currie's observations were contained in his work "Medical reports on the effects of water, cold and warm, as a remedy in febrile diseases" etc., Liverpool, 1797.]

Influenced by his experience James Gregory, Wm. Falconer, Baron Thos. Dimsdale, James Home, John Clark, Thos. Bateman and others employed Currie's treatment in acute diseases.

In France the cold-water system found little sympathy, though the drinking of cold water was employed (1721) by Etienne Franç. Geoffroy in the oriental plague at Marseilles. "Cold water may be considered a universal remedy, good for all diseases in general, and for the plague in particular, easy to find and to apply. It has no other fault than that of being too common and too well known, and therefore too little used" — a remark which indicates a cold water enthusiasm appropriate only to our own century.

Pierre Noguez (1725) recommended cold baths in acute rheumatic and catarrhal diseases, in pleurisy and pneumonia, and likewise in chronic troubles, where they were also commended by Dr. Pomme. Finally Tissot praised them in nervous debility and defective transpiration, in case the air was dreaded.

The enthusiasm over the cold-water treatment made its way even to Spain, where the Dr, Sangrado, famous in his own way and well-known from Gil Blas, lapsed into the new method.

Electricity (particularly that of amber) was known at an early period, and lightning-rods were employed by the Egyptians as early as B. C. 1500. These, as stated by Dümmichen, consisted of high poles tipped with copper and gilded. That electricity was also employed at an early period in the treatment of disease is shown by the fact that Scribonius Largus (A. D. 43) had the torpedo applied to patients suffering from protracted headaches.

But it was not until the discovery of the electric spark by Guericke, his invention of the electric machine, and particularly the studies upon electricity made by Francis Hawksbee (died 1713), that the effort to employ electricity upon man was renewed (1729) by Stephen Gray. After the invention of the Leyden jar in the year 1745, Musschenbroek (1692–1761) experimented with the same, and Andr. Gordon, a professor and Benedictine monk in Erfurt, electrised animals (1745). All these were, however, merely preliminary researches, and

CHRIST. GOTTL. KRATZENSTEIN (1723–1795) of Wernigerode, professor in Copenhagen, was the first who employed electricity to cure weakness and paralyses, though J. A. Nollet (1700–1744) and professor Jallabert of Montpellier had already used it in such cases, without finding its curative effect specially reliable. A fashionable mode of treatment was speedily made out of electricity, and its use was at once extended to all nervous troubles, (just as we see again to-day). A perfect flood of writings in favor of, and also against, its use made its appearance, while we of the present day can as yet record only those which favor its employment.

Among the votaries of the fashionable remedy were Sauvages, de Haën, Johann Gottl. Schaeffer (1720–1795; father of Joh. Ulrich Gottl. Schaeffer: "Die electrische Medicin" etc., 1752) in Regensburg, to whom it seemed that he was living in an electric age (what would he have said had he survived to see our present electrical epoch?); William Watson (1715–1788), Floyer and others. Haller, William Rowley, professor in Oxford, and many of the sober English were active opponents.

The electric bath was introduced as a remedial agent by Gottl. Friedr. Rössler (1768), and the electrometer by J. Friedr. Hartmann (1770).

Mauduyt in 1777 employed electricity in the treatment of amblyopia. The same agent was also used even by Charles Darwin in the treatment of jaundice, and again by C. Gerhardt, professor in Würzburg and subsequently in Berlin. Whether, however, Darwin was as successful in his results as Gerhardt was in four cases only, is not stated. Hufeland subsequently recommended electricity for the relief of asphyxia in the new-born and in children, advising that one pole should be placed upon the nape of the neck, the other upon the pit of the stomach, i. e. over the diaphragm.

The electric treatment found in that day more severe critics than our iatro-physical treatment. Thus Wichmann, as early as 1765, wrote:

"There are fashions in medicine, and every physician must be their slave . . . New remedies seldom work as well for another as for their discoverer. . . . Eighteen years ago it was the fashion in all Europe to electrise paralytic patients, but the fashion only lasted nine years. Medical fashions generally agree with other fashions in going out of use ordinarily after nine or ten years. The fashions too which prevailed 30–40 years ago are returning, e. g. the high coiffures (which seem at that period to have been classed with the use of electricity). The same is the case with electricity. The most modern and popular fashion among the doctors is the treatment by the magnet." (Rohlfs.)

Friedrich Wilh. Klarich, the physikus in Gottingen, was the first who had "extremely favorable" results with this latter instrument in 130 cases. Unzer and J. A. Heinsius, however, did not permit themselves to be carried away by the new enthusiasm. Mesmer originally trod the stage of the mountebank with the same agent, and then went over to the absolute humbug of animal magnetism, an absurdity by which, as we have seen, even men of importance allowed themselves to be taken in.

CLIMATIC TREATMENT

began to become popular. This was in vogue even among the Ancients, and particularly for consumption. Galen e. g. recommended mountain air in consequence of its greater dryness, while Antyllus and Ætius advised lofty localities, i. e. rarified air, in this disease (Thomas). In like manner Tissot and Peter Frank recommended residence in the Apennines, and Mayer in Arbon, as early as 1741, used to send patients to Appenzell for the purpose of drinking milk, a method of treatment also practised among the Ancients and during the Middle Ages.

PHARMACY

during the 18th century did not make those great advances which the development of its subsidiary sciences — chemistry, botany etc. — might have enabled it to attain. On the whole, both the ancient remedies and the methods of preparation of preceding centuries remained in vogue, together with their innumerable compound preparations, so that the pharmacies still resembled considerably a witches' kitchen. Yet a new era was preparing and a new road was being laid out, since men of importance dedicated their powers to the reorganization of this branch. The fact that academic instruction was now imparted to the apothecaries (though at first in Prussia and France only) was one of great importance.

The Hollander

JOH. CONR. BARCHUSEN (1666–1723),

professor in Utrecht, who has been already mentioned as an historian, and who was a famous authority in pharmacognosy and pharmaceutic chemistry, as well as "the founder of chemical pharmacognosy", rendered important services to pharmacy.

CASPAR NEUMANN (1683–1737), the first scientific apothecary in Germany, wrote also in German and was the founder of a German pharmacy.

Neumann was the son of a merchant in Züllichau, and was originally designed for the ministry, but at the age of twelve years entered an apothecary's shop as an apprentice. Subsequently he came to Berlin and attained the position of "Reiseapotheker" of Frederick I. (1657–1713), to whom he had recommended himself by his musical talents. In 1711 the king sent him upon scientific travels through Germany, Holland and England. After the death of his patron, through the influence of the notorious body-physician Gundelsheimer, Neumann had his discharge handed to him in London. Left thus without means, he was maintained by a painter until he secured his own support by an engagement in the laboratory of a physician. Five years later he went with George I. (1669–1727) to Hanover, and from that place visited Berlin and Stahl, the physician-in-ordinary of Frederick William I. (1688–1740). The latter physician secured for him again a salary to travel, and with the aid of this Neumann once more visited England, France and Italy. In 1723 he was appointed professor of practical chemistry in the medico-chirurgical college, and a year later a member of the Obercollegium medicum. He likewise received the oversight of the entire Prussian apothecary-department, and was provided with other civil and academic honors. Neumann was a fruitful writer, and among his works was a treatise entitled "Gründliche und mit Experimenten erwiesene medicinische Chemie".

After the death of Neumann his place as professor in the Obercollegium medicum was filled by

Joh. Heinrich Pott (1692–1777) of Halberstadt.

Among Neumann's teachers in France were the famous apothecaries and chemists Étienne (1672–1731) and Claude Jos. Geoffroy (1686–1752) in Paris, who brought forward the doctrine of elective affinity — a doctrine so important that it was employed metaphorically e. g. by Göthe — and in 1718 drew up the first table of affinities.

The services of Murray we have already mentioned. Quite level with him stood

Andr. Sigism. Marggraf (1709–1782) of Berlin,

the pharmaceutical chemist, discoverer of phosphoric acid, the identity of cane and beet sugar,[1] and numerous other bodies. He was likewise a member, and director of the physical class, of the Academie.

Joh. Christian Wiegleb (1732–1800),

an apothecary in Langensalza, is important as an historian of chemistry and the author of a "deutschen Apothekerbuchs nach neueren und richtigeren Kenntnissen in der Pharmakologie".

Joh. Georg Model (1711–1775),

was chief apothecary in St. Petersburg. The Swede

Carl Wilhelm Scheele (1742–1786),

born in Stralsund (at that time still belonging to Sweden), died in Köping in Sweden, attained a world-wide fame. He was the discoverer of oxygen and nitrogen, tartaric acid, baryta, chlorine, arsenious acid, oxalic acid, uric acid, lactic acid (according to others discovered by Berzelius) etc. His countryman, already mentioned,

Torbern Bergmann (1735–1784) of Catharinenborg in Westgothland,

teacher of chemistry in Upsala, enjoyed no less fame. His chief services were rendered in the study of inorganic bodies and preparations.

Among the French chemists and pharmaceutists — almost all famous chemists in the 18th century had been apothecaries, as in the 17th and 16th centuries they were physicians — we may mention:

Jean Franç. Demachy (1728–1803),

director of the apothecaries of the civil hospitals in Paris;

Antoine Baumé (1728–1804) in Paris,

teacher in the Collége de Pharmacie;

Pierre Jos. Macquer (1718–1784),

professor of chemistry in the Jardin des Plantes and a member of the medical faculty;

Lavoisier;

Guyton de Morveau (1737–1816),

who first recommended chlorine fumigations as a disinfectant.

In England the world famed

Priestley and

Henry Cavendish (1731–1810),

the discoverer of the composition of water, distinguished themselves.

Among the Germans who rendered service to pharmacy we should add:

Martin Heinrich Klaproth (1743–1817)

professor in Berlin;

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[1] His pupil C. Achard (1753–1821) introduced the fabrication of this sugar, which at the present day has become dietetically so important.

Joh. Friedr. Aug. Göttling (1755–1809), professor in Jena;

Joh. Friedr. Gmelin (1748–1804) in Tübingen;

Carl Gottfr. Hagen (1749–1829) in Königsberg;

the "Nestor of German pharmacy"

Joh. Barthol. Tromsdorff (1770–1837), professor in Erfurt, where in 1795 he opened the first "Pharmaceutical Institute" in Germany.

Many other eminent apothecaries, chemists and physicians, who, like Stahl, Hoffmann and others, occupied their attention with pharmaceutical matters, might be named as promoters of the apothecary's art. But a more detailed enumeration of them would not correspond with the plan of this sketch, and for a more intimate study of this subject the reader is referred to the works of the historians of chemistry and pharmacy, Wiegleb and Gmelin, who belong to the 18th century, and to the work of Ferd. Jac. Baier (1707–1798) in Altdorf, on the subject of famous apothecaries.

9. EPIDEMIC DISEASES.

Great epidemics have ever had, on the whole, the same significance in the development of medical science and art, as great wars in the development of the science of war. Indeed their importance is sometimes still more profound, since epidemics often serve to demonstrate the powerlessness of prevailing methods of treatment, and the falsity and error of highly prized theories, indeed of the foundations of accepted science. They aid not rarely in overthrowing entire phases of past development. Such was the case e. g. with the appearance of syphilis, and subsequently with that of the cholera, which set aside the preceding tendencies of medicine and brought about the supremacy of the French pathologico-anatomical school. And although the epidemics prevailing during the 18th century did not result in a complete revolution in the medical world, they yet stirred it up to productiveness and created new problems for investigation and for treatment.

The bubo-plague, "the disease of barbarism" and especially of declining nations, in the 18th century still often reached the north of Europe, though it maintained its chief focus and headquarters in the south-west. Thus from 1703 forward, as the result of the Russo-Swedish war, it spread from Turkey to Sweden, Denmark, Poland and Prussia, so that in 1709 the coldest year of the 18th century, more than 300,000 human beings died in East Prussia in spite of the intense cold, and in Dantzic alone more than 30,000. Obliquing to the west the plague reached Styria and Bohemia, and was carried by a ship to Regensburg in 1714, but by means of strict quarantine regulations was prevented from spreading to the rest of Germany. A hurricane swept the disease, as it were, out of all Europe. Yet six years later it appeared anew with devastating force in southern France. The epidemics of 1737 in the Ukraine, 1743 in Messina, 1755–57 in Transylvania, 1783 in Cherson (observed by Howard, to whom it also proved fatal), and those in Volhynia and Slavonia in the last decennium of the century, were less severe. The plague raged with almost its worst severity in Moscow in the years 1770–71, and this epidemic found its Thucydides in Gustav Orräus (1739–1811), a Finlander and the first doctor who graduated in Russia. He was compelled by Catharine II. to answer with his head for the correctness of his diagnosis of the disease. Of 230,000 inhabitants there died more than 52,000, and in September alone 600–1000 per day. In this month stupidity and fanaticism instigated a murderous sedition — even a priest was murdered, a thing quite unheard of in Russia — and the physicians were threatened until they were forced to save themselves by flight. Grape-shot put an end to the revolution, but not to the plague, which did not die out until 1774. After its departure nearly 1,000 putrid corpses, which the rude and fanatical populace had concealed, were discovered.

Epidemics of typhus fever (called "Kriegs-, Fleck- or Faulfieber", and by the masses at a later period "russisch-polnisches Fieber") showed themselves at the beginning of the century in small numbers, but disappeared before the plague. From 1733 forward, however, the disease appeared again in the train of the wars, as e. g. in Prague in 1742, where 30,000 French fell victims to its ravages. It appeared also with other diseases in the Seven Years' War. In 1760 the typhus raged with murderous violence in the vicinity of Mayence. During the sixth decennium of the century it visited Spain, France and Upper Italy. In 1778, as the so-called "famine-typhus", it ravaged Saxony, in 1783 Italy, and in the last decennium of the century (an epoch specially distinguished for its epidemics) it desolated France, the borders of the Rhine, the Black Forest, Bavaria and Upper Italy.

Epidemics of "putrid fever", "gastric fever", "lingering nervous fever" — the term "nervous fever" originated with Willis — were described, and they were regarded as due to the transition of the "asthenic-inflammatory" into the "asthenic-putrid" constitution, of the "bilious" into the "putrid character", or to the "predominance of the gastro-bilious, atrabilious or catarrhal element".

"Worm-fever", of which there were subordinate varieties, as e. g. febris hysterico-verminosa, was observed by van den Bosch in 1761–64.

The first description of typhoid fever — under the designation of "Schleimfieber" (morbus mucosus) — appeared in the 18th century, and was due substantially to Roederer, though its publication was made by his pupil Karl Gottlob Wagler (1732–1778), subsequently a professor in Braunschweig.[1] They described the disease in 1762, and were the first (Rohlfs) to utilize the pathological anatomy in the study of an entire epidemic. As regards its etiology, these first two observers already mention the contamination of the springs with filthy water.[2] The disease was subsequently described by Mich. Sarcone in Naples, John Armstrong, Campbell, William Grant and Stoll.

Malaria in the last century still gave rise to great epidemics. Of course all the conditions of life favored its prevalence. Thus e. g. there were no high-roads, and Göthe, Haller, Zimmermann and others came near losing their lives while traveling, in consequence of the bad roads. Even the streets of most cities were unpaved and saturated with the droppings of animals etc., while drainage and the regulation of the flow of streams were nowhere thought of. Epidemics of malaria were diffused over almost all Europe in 1718–22, 1726–28, 1748–49 etc. They prevailed in Germany,

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[1] Of course it is very difficult, if not impossible, to indentify precisely many of the diseases and pathological conditions described by early writers, but Hutchinson believes that observations of cases of typhoid fever are to be found in the writings of Van den Spieghel (1624), Dom. Panaroli (1652), Willis, Baglivi, Sydenham, Lancisi, Huxham (slow, nervous fever), Sir Rich. Manningham (febricula or little fever, 1746), Morgagni and Joh. Christ. Riedel (1748), all of which anticipated those of Roederer. The latter, however, furnished the most complete and accurate description of the disease which had yet appeared. (H.)

[2] H. H. Helcher, a practising physician in Schweidnitz and the precursor of the modern ground-water theory of Pettenkofer, as early as 1714 associated the condition of the water with epidemics, particularly epidemics of the plague.

France and Hungary in 1770-1772, in Holland 1779-81. They were always combined with other forms of fever, to which they imparted their peculiar character.

Dysentery prevailed in extensive epidemics, particularly in years marked by hot dry summers, followed by humidity. Such an epidemic prevailed throughout all Germany in 1719. In 1727 Switzerland was ravaged, in 1743 parts of Sweden, in 1750 northern France and Switzerland, in 1757-1759 and 1761-63 Westphalia, 1779-81 almost the whole of northern Europe; in 1783 Germany was again chiefly ravaged, in 1794 Flanders and Hanover, and 1796-97 North America. Individual cities were particularly scourged, e. g. Eisenach in 1728, Rouen in 1743, Plymouth 1741, Nymwegen 1756, Mayence 1757-59 etc.

Ergotism still prevailed in many places during the 18th century, both epidemically and sporadically. It appeared as an epidemic in France in 1709 and 1770-71, in Germany 1716-17 and 1741. It showed itself in the gangrenous form particularly in France 1709, 1710, 1747, 1764, 1770-71; in Italy 1710, in Switzerland 1716-17. Under the form of convulsions it manifested itself especially in Germany, and in 1700 in Thuringia, 1702 in Hanover, Lüneburg and Freiburg; 1716-17 in Silesia and Saxony as well as Schleswig-Holstein; 1722-23 and 1736-37 in Silesia, Bohemia and the Mark; in northern Germany and Westphalia in 1741; on the Rhine in 1756 etc.

The last century was also rich in pandemics, epidemics and endemics of influenza.

"La Grippe" (influenza) appeared as a pandemic throughout almost all Europe in the years 1709, 1729, 1732, 1742, and 1788; in almost all America in 1732, 1737, 1751, 1772, 1781 and 1798; throughout the entire eastern hemisphere in 1781, and in the entire western hemisphere in 1761 and 1789; throughout Europe and America in 1767. It prevailed as an epidemic in France in the years 1737, 1775 and 1779; in England in 1758 and 1775, and in Germany in 1800. Finally it appeared as an endemic in 1775 in Vienna and Klausthal, 1757 in Boulogne, 1758 in Lille and Paris, 1780 in St. Petersburg, 1781 in Wilna etc.

Hooping-cough had become naturalized everywhere in the 18th century. It prevailed with special malignity in northern countries like Denmark and Sweden, in which latter kingdom 43,000 children died of the disease in 1749-64.

Diphtheria, which in the 17th century had showed itself almost exclusively in Spain and Italy, was observed during the 18th in all parts of the world. Thus it appeared in Spain in 1750, 1751 and 1764; in Portugal 1749, 1786; in France 1736-37, 1745-47, 1748-58, 1774 and 1787; in Italy 1747; on the Ionian islands 1701; in Switzerland 1752; in Germany 1752, 1755 and 1786; in Holland 1745, 1754, 1769-70; in England 1744-48, 1790 and 1793; in Sweden 1755-62; in North America 1752, 1775 and 1799, and in the West Indies in 1780.

Epidemics of croup prevailed in France 1746-49; in Sweden 1755-61; in Heilbronn 1758; in Göttingen 1758 and in other places.

Epidemic pneumonias (bilious and putrid pleuropneumonia) prevailed frequently and widely distributed over the whole world, particularly in spring and winter. Such was the case in France, Switzerland, Italy and Germany. In other countries they occurred more rarely and with less severity.

Small-pox had attained general diffusion, so that only epidemics of special fatality are mentioned. Thus there died in Paris of this disease in 1719 14,000 human beings, and it prevailed with special malignity in Tuscany in 1764. In 1770-71 a pandemic arose, which ravaged especially the East Indies, so that three millions of human beings died there. In 1766 and 1770 the small-pox raged in London; 1749-1765 in Sweden (of 1,391,233 children, 144,194 died); 1769-70 in Paris; in Vienna first in 1763 and again in 1767, on which occasion the wife of the emperor died of the disease, while Maria Theresa survived it. In Kamschatka in 1768-69 one half of the inhabitants perished. The Iroquois were also visited by the disease. The last fourteen, and particularly the last five, years of the 18th century were again marked by very severe outbreaks of this disease.

Scarlet fever, first observed in the 17th century, had already gained wide diffusion. It showed itself for the second time in Breslau in the year 1700; in Paris 1707 and 1712; five years later in Berlin, Thuringia (where it lasted many years Florence etc. The disease made a pandemic tour embracing both hemispheres from 1776 down into our own century, and at the outset and towards its close manifested a peculiarly malignant form, so that in the period from 1795 to 1805 it is said that in Saxony alone 40,000 children perished. Adults were attacked by it. — The distinction between scarlet fever and

Measles in the 18th century was still very unsatisfactory. Epidemics of the latter disease were observed among the negro slaves of Brazil in 1749, and were accompanied with very great mortality owing to intestinal disease. The disease also prevailed in Lille in 1757, Rouen 1732, Erfurt 1778–79, Erlangen 1783, Upper Italy 1786 and throughout almost all France, Germany and England from 1796 to 1801.

Epidemic erysipelas was also mentioned occasionally during the 18th century, e. g. in Naples 1700, at Caillan in France 1750 and in Padua 1786.

Observations of endemics and epidemics of puerperal fever were multiplied. This disease ravaged particularly the great lying-in institutions of Paris, London,[1] Copenhagen, Dublin, Edinburgh, Berlin etc., but also made its appearance in smaller places, e. g. in Gladenbach near Giessen (where mention is made of it in 1784 and other localities.

The "miliary fever" was originally observed only among lying-in women and sporadically in Middle Germany, and first in the 17th century, but in the 18th century it appeared among other women and even among men, particularly in France. In Germany it was first described by Fr. Hoffmann for Frankfort in the year 1723. From France accounts of numerous — about 70 — greater and lesser epidemics during the 18th century were given. These advanced gradually from the Rhine into the interior. They prevailed chiefly in summer and spring very few in the winter. The disease also showed itself in Italy.

Yellow fever, first recognized in the 16th century and mentioned occasionally in the 17th, appeared with great frequency in the 18th century, but was mostly confined, as at a later period, to America. Thus of the greater epidemics of this disease which have been described, 227 affected America, 43 Europe and 4 Africa. In 1723 the yellow fever reached Lisbon, in 1730 Carthagena, 1731 Cadiz, 1741 Malaga, and in 1764 and 1780 it again prevailed in Cadiz. In the last decennium of the preceding century, however, a period during which, as already mentioned, epidemic diseases in general reaped a reach harvest, yellow fever appeared in very extensive epidemics.

10. PROFESSIONAL RELATIONS.

The 18th century is justly regarded as the golden age of the medical profession. This is true, indeed, in a higher sense than ordinary, but it is also eminently true in the usual sense of those terms. The reasons of this fact were numerous. First and foremost we may claim the idealistic undertone of the whole century, as the result of which the selection and practice of scientific vocations, among physicians as well as the laity, enjoyed higher esteem than it does at the present day. Medical practice was regarded in all circles as a matter of conscientious vocation, and not as one of the higher classes of business. Most members of the medical profession — certainly the better class at least — also possessed, or at least strove to attain, a universal and humanistic education, quite in contrast again with our own day, which, with rare exceptions, finds its pleasure, and seeks its highest object, in the one-sided education of special branches. Hence the physicians of the 18th century almost universally strove, with a consummate love of science, to gain for themselves an acquaintance with all the special medical and medico-technical branches of knowledge.

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[1] Edward Strother — in a literary sense the successor of Willis — described puerperal fever as a special form of fever in 1718. [The first edition of his "Critical essay on fevers" appeared at London in 1716. (H.)]

Upon the facts just mentioned depended not only the high self-respect of the physicians themselves, but also the general esteem which met them everywhere. To this must be added as a further factor the generally suitable number and distribution of the existing physicians. They were not so scarce as to render their services unattainable, nor yet so numerous that, as in many localities to-day, they were compelled to seek their daily subsistence with anxiety or, like mountebanks, with advertisements in the newspapers, and thereby render themselves the absolute slaves of the public. For all these reasons the physician of that day occupied a high position socially. The public did not regard him as a tradesman, permitted to work only so long as he gives satisfaction and does not charge too much. Hence it resulted that among his clientèle he was looked upon rather in the light of a family friend, than as a mere business friend — the popular idea at the present day. The frequent change of physicians was a thing entirely unknown. No one without very pressing reasons abandoned his previous physician. Patients very rarely made pilgrimages to see professors — indeed the means of intercourse were so defective that they *could* not — and the professors themselves dared not prejudice their position as teachers, which was their chief reliance. Moreover the practising physicians did not regard themselves as subordinate to the professors in practical matters, but, on the contrary, knew that they were in these their superiors. Accordingly we can readily understand that the position of the practising physician was the more respected and trusted. Most physicians were so-called family physicians (Hausärzte), who, however, did not secure their clientèle for one or more years for a stipulated annual payment in gross, or rather did not hire themselves out for such a sum, but the families concerned, of their own free will, relieved the physician of the disagreeable and painful task of demanding money for professional services. By this arrangement the acquisition of medical practice was, it is true, more difficult than it is at the present day. Practice, as a rule, was only to be obtained by a kind of inheritance, so to speak, on the death of some physician; or through the recommendation of some older physician, and the possession of eminent general and special medical ability. Such was the case in the cities and the better classes of society, and the rest of the country followed their example. In the country there were still comparatively few physicians proper, so that here they were rather difficult to procure, and accordingly they continued to be held in permanent esteem among the masses, who, as we know, prize only the more highly that which is difficult to obtain. The higher practitioners, in contrast to the physicians of the lower class, who still existed, formed a kind of superior tribunal, and thus again the reputation of the former was increased. The great majority of physicians descended from, or at least moved in, circles of genuine education, and thus the half-educated and ignorant were preserved from arrogating equality with them, and from the insolent behavior toward the physician which might ensue from such association. Physicians who had received the doctorate were counted among the "gentry", and not, as at the present day, among the artisans and traders. Indeed in many states they enjoyed a certain "rank", like military officials, and they were generally allowed to wear a sword. As the physician himself did not estimate cultivation according to the purse, so he preserved in presence of the wealthy the self-respect and the behavior of a man of genuine education, which manifested themselves externally in a dignified deportment and, not very infrequently, in the affectation so characteristic of the age of perrukes. However, even the last was at all events better than its opposite, which we so often see. People in those days generally took off their hat to the physician, for they recognized him by his demeanor as the representative of a noble profession, and a man who saw in his patient a thorough, and indeed a suffering, human being, to whose aid he was called, not a subject submitted to the so-called objective and exact investigation of the disease of some particular organ. The physician based his plan of treatment upon the entire man before him, not upon the pathological changes demonstrable within him. He was, in accordance with the requirements of Hippocrates, likewise a psychologist or philosopher, not a mere technical practitioner of the healing art. Moreover, physicians generally were full of genuine devoutness — undoubtedly often too full of superstition — however far the most of them might be from all sacerdotal and dogmatic religion. Not a few, and particularly not a few of the more considerable physicians, came from the parsonage, whence there may have clung to them a certain profundity and a greater earnestness in their conception of life. Indeed, they often considered themselves, as it were, priests of humanity, and as such occupied in most relations within their circle of activity the place of religious pastors and domestic clergy.

Most physicians too made a choice of the medical profession in a feeling of deep earnestness, as was, indeed, the case in the choice of all callings at that time, and thus there was a greater number of physicians at once actually and genuinely called into the profession by a love of their calling and by their natural gifts. Finally, the state took care everywhere to afford physicians, in the true sense of the term, greater protection than had been ever before the case. Accordingly it strove energetically by legal ordinances to separate them from the numerous dabblers and quacks, and the medicasters, who in past times had been their open rivals. Although this was accomplished quietly and gradually, yet the strolling medical vagabonds were no longer able, as heretofore, to prejudice with impunity the profession of the higher physicians, a thing which our present trade-law has, alas, once more rendered possible. The better classes of the public acted unconsciously in accordance with the utterance of Seneca: "Thou dost deceive thyself when thou thinkest a small fee only to be due to thy physician; for thou dost purchase from thy physician an inestimable thing — life and good health. Therefore he is paid not the price of ordinary wares, but the value of an internal effort. As he serves us, and when called neglects his own affairs for our good, so there is due to him not the wages of ordinary service, but the honorarium of a profession."

In a social point of view the 18th century was of the greatest importance to physicians from the fact that it finally bore to its grave that division of the higher medical faculty into physicians and slightly educated and despised surgeons, which the mediæval Church and the Arabians had called into existence. In how many other ways did the century of the Revolution put an end to the Middle Ages!

Of course the sharp shadows of the century, as well as of the profession itself — including the famous "colleagueship", directed at that period particularly against the surgeons — and the usual charges of misconduct, were not lacking to the picture of the medical profession. Should we speak of these, strong shadows would, indeed, show themselves; but from an historical point of view we should be guilty of injustice if we laid too much stress upon such matters, for they can never determine our estimation of a profession, but only our judgment of its individual members. Vulgarity is at all times the same; only at certain times the better members of the profession distinguish themselves by a greater preponderance over the vulgar masses, and this preponderance was particularly manifest in the last century.

Physicians received their general preparatory education at the gymnasia or the so-called academic gymnasia — institutions intermediate between the gymnasium and university, and in which special branches were taught modo academico — and partly too at the universities themselves. To the latter the students were often accompanied by private tutors. Originally attendance upon philosophical lectures also was required. Such was the case until 1848. In Austria attendance for two years upon lectures on "philosophy", i. e. logic, psychology, natural history and general history — the latter two for free students at least — was required before proceeding to medicine proper, jurisprudence or theology. Our present "Maturitätsexamen" (examination for matriculation) was generally unknown during the whole 18th century, as it is to-day in England and (with some exceptions) in America, though in Prussia (at the instance of Gericke) a beginning was made in 1788. The testimony of the director of the gymnasium as to the maturity of the student was sufficient; indeed even a short so-called "deposition" before the philosophical faculty, i. e. the simple answering in bad Latin of a few Latin questions, which the dean of the faculty in question proposed in the presence of the "Depositar", who had the duty of supervising this examination, sufficed for matriculation. Young noblemen who had been educated by private tutors were not required to pass any examination at all. The supervision by the state of the educational course of the students had not as yet reached the point attained at the present day. Perhaps the result of this was that many students, because they were free from all compulsion, educated themselves more profoundly in certain branches than would ever have been the case in pursuing a prescribed and rigid course of study. The 18th century too first introduced mathematics and geometry as new subjects of gymnasial instruction, indispensable henceforth for medical students. It was also in the beginning of this century that "Realschulen"[1] took their origin, and this name made its first appearance in Halle in 1706 (Paulsen). In spite of the complaints of overtasking the students, which were not wanting even in that day and resulted from the introduction of realistic subjects of instruction into the gymnasia, more effort was made in instruction to attain the *multum* than the *multa*. More was left to private study and individual disposition, though much that was "unnecessary" was thus learned. Even the study within the universities was in many respects more free than it is at the present day. Above all, a definite term of study, examination ordinances etc., prescribed by the state, were exceptional, and first appeared in Prussia in the later decennia of the century. At first all these matters were arranged by the individual universities or faculties for themselves. Hence students of extraordinary ability were not forced to pursue the same course for the same period as might be requisite for the less capable. No universal and obligatory directions regarding academic record-books (Belegbücher) were yet known, although the professors furnished testimonials of the course of study pursued by the students. There were too no compulsory lectures, particularly in the natural sciences, and yet individual physicians attained considerable knowledge in certain of these, and especially often in botany. Indeed the latter study, like chemistry in the 17th century, was the recreation of very many physicians. The students enjoyed substantially the liberty of studying what they pleased,[2] as the professors did that of teaching as they pleased.

Among the fundamental branches of medicine the study of anatomy was that which was now chiefly promoted in Germany. Even at the beginning of the 18th century, however, many students were compelled to visit foreign universities, because the arrangements of those in Germany were so defective. The French universities and those of the Netherlands, particularly Leyden, Strassburg and Paris, were chiefly patronized by German students. In Strassburg, Salzmann from the year 1708 had the students dissect daily from 10 to 12 o'clock, and every other day demonstrate in the auditorium the dissections made the day before (Wieger). In the early years of the century suitable dissecting-rooms, and above all a sufficient number of bodies, were wanting, so that Haller e. g., in the year 1723 while studying under Duvernoy in Tübingen, was still compelled to dissect chiefly dogs. In Leyden too anatomical material was deficient, and Albinus received only one body for dissection annually. Under such circumstances the great Haller looked upon it as a special favor that this famous teacher permitted him, for a considerable compensation, to dissect on the second half of the body that which Albinus himself had dissected upon the first. Indeed in Paris Haller was compelled to steal bodies — and to fly for his life when the theft was discovered. Hoffmann in 24 years was able to dissect only 20 bodies, and even in the middle of the century only one dissection was made in Halle annually in the existing "Anatomiekammer". Even the latter room was a subject of dispute between the university and the magistracy, so that the magistrates claimed and even took possession of it, although the university had paid an annual rental of 30 marks and expended 330 marks upon it for repairs. Werlhof relates that in Helmstädt he and five other students formed a fund from which they contributed to the burial expenses of poor people in the city and country, in order to obtain permission to make dissections. He even proposed this plan to the professors for their imitation. In Prague during a period of twenty years (1692-1712) only three dissections were made (more are made now in a single day!), and in Göttingen, the "progressive" university of the last century, matters were no better until Haller was called there. The "theatrum anatomicum" (as the German dissecting-room was called) founded in 1713 in Berlin was the pride of the city, and has been the hobby of all ordinances relating to the study of medicine and surgery, which have been issued since 1725. Attendance upon it was continually enjoined upon physicians, and it was relatively well supplied with bodies. Indeed as early as 1786 the supply of suicides and persons who died in the work-houses and hospitals was so great that about 200 bodies were at the disposal of this institution. A Berlin professor affirms that many foreigners (i. e. in the conception of that time non-residents of Prussia) came to Berlin on account of this anatomical theatre, just as they do to-day for its institute of pathological anatomy. In Vienna such a theatrum anatomicum was opened in 1718, but it was not until 1735 that J. H. Mannagetta the scion of a Viennese family of physicians, was appointed the first official and special professor of anatomy. Bodies, however, were so scarce that in 1741 scarcely a single dissection could be made, while in Strassburg, on the contrary, Joh. Jac. Salzmann in 1725 was able to dissect thirty, and in 1760 even sixty bodies in a single winter, and besides this to practise surgical operations upon the cadaver. Regular exercises in dissection were rare, although, as we have said, they took place in Strassburg and were paid for extra, e. g. in 1790, 20 marks for a dissection of the muscles and nerves. Anatomical demonstrations in the public lecture-room were still an important question, and in Strassburg 10 marks were to be paid to the fiscus for these. The prosector was a surgeon, or even a barber. Würzburg received its first theatrum anatomicum at the hands of the prince-bishops Ph. Fr. von Schoenborn (1719–1724) and Chr. Fr. von Hutten (1724–1729). It was formed out of a summer-house of the "Juliushospital" and reorganized in 1788, but a new and worthy building was not inaugurated until 1883. In Italy Fontana made his wax preparations in order to use them for purposes of instruction instead of bodies, which were very scarce. In Spain, on the other hand, where in its prime a Vesalius had labored, no dissections were made, and even a special teacher of anatomy did not exist as late as the middle of the century.

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[1] The German "Realschule" is a school in which the modern languages and sciences are taught. (H.)

[2] In the Portuguese university of Coimbra such was — and is still — the case.

In Braunschweig in the year 1780 three thalers were paid each semester for exercises in dissection.

[The English statute of 1540, as already mentioned, permitted the Company of Surgeons to take annually the bodies of four executed malefactors "for anatomies", and a similar privilege was extended to the College of Physicians by Elizabeth in 1565. The number of bodies thus legally allotted to the study of anatomy was increased to six under Charles II. (1660–1685). The colleges of surgeons and physicians were thus the sole places where the study of anatomy could be lawfully pursued, and accordingly we find many of the English anatomists of the 16th and 17th centuries holding the position of lecturers on anatomy in these colleges. Yet that the study of anatomy was not exclusively confined to these institutions is manifest from the fact that e. g. Wharton and Thos. Winston, both professors of medicine in Gresham College, London, delivered lectures on anatomy in the 17th century. Neither Oxford nor Cambridge, however, received a professor of anatomy until the 18th century. — The earliest university in Great Britain to create a chair of anatomy was Edinburgh, where Robert Elliot, who had lectured upon anatomy before the College of Surgeons of Edinburgh (organized in 1694), was appointed professor of anatomy in 1705 with an annual salary of £15. The College of Surgeons had opened an anatomical theater in 1697, and this was now turned over to the university. In 1708 Elliot was allowed an assistant, Adam Drummond, who continued to hold his position until in 1720 he resigned to make way for Alexander Monro (Primus), whose anatomical instruction soon became famous throughout Europe and America. A chair of anatomy was also established in Cambridge in 1707, in the University of Glasgow 1718, and a "lecturer on anatomy" was appointed at Oxford in 1750. The University of Dublin also provided a chair of anatomy in 1785. Some idea of the scope of the anatomical instruction of the 18th century may be gleaned from the information that the syllabus of the anatomical lectures of Mr. Nourse, published in 1748, and "totam rem anatomicam complectens" comprised only 23 lectures, and at one of the most reputable courses of anatomy in Europe, where Hunter himself was a student, the professor was compelled to demonstrate everything except the nerves, vessels and bones upon a single cadaver. The vessels and nerves were shown in a fœtus, and the operations of surgery were demonstrated upon a dog. (H.)]

Until the middle of the century the clinical method of instruction in pathology and therapeutics was adopted in Leyden alone. With the exception of this university, everywhere in Germany theoretical lectures upon these two subjects were read from the manuscript in the ancient style, and it was not until a later period that a few professors ventured to lecture extempore. Everywhere the lectures were dictated to the students, and hence arose the expression perpetui dictatores to designate professors. The physicians were so-called medici ex commentariis, that is doctors who had acquired their knowledge of diseases from their books only. Hence arose the saying that a new physician must always fill a graveyard before he could actually know diseases. Rarely, and only as the result of special favors, did the student see ambulant or private patients under the direction of his teacher, unless he practised himself, a thing which, in spite of all prohibitions, happened frequently enough.

The earliest ambulatory clinic[1] was ordered at Prague in 1745. "The students should learn to examine, investigate, inspect and treat the sick in the Leyden style (praxis exercitiva sive clinica viva)." In these clinics the poor received advice and medicine gratis. Everything was arranged just as in our modern policlinics. This institution, however, survived only one year. Anton Wenzel Rings (graduated 1735) was its president.

The first clinical institution in Germany was organized at Vienna by van Swieten in the year 1754, and placed under the charge of de Haën, who was also obliged to publish clinical reports. This clinic was established in the "Bürgerspital", with only six beds for men and the same number for women. All of these beds were to be filled from the "Dreifaltigkeitshospital" and other similar institutions. After the example of Vienna clinics were also established in the other Austrian universities, and likewise in Pavia 1770 under Borsieri, in Prague 1781 under Joseph von Plenciz (1752–1785), who also taught gynæcology, and another with eight beds under Krzowitz in Ofen 1777. In Göttingen, Peter Frank, when he became professor there in 1784, and in Jena, Hufeland, rendered good service in the introduction of the clinical method. Towards the close of the century Tübingen received a clinic with — four beds. Strassburg did the same. It may also be remarked that the great Joh. Peter Frank desired animal clinics to be established for physicians (besides those devoted to human beings), for the purpose of studying comparative pathology.

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[1] The German system of clinical instruction is divided into 1. the ordinary hospital clinic; 2. the policlinic, where the sick are visited by the students at their homes under the supervision of the professor; 3. the "ambulatory clinic", where the patients, or the reporters of certain cases, meet at some determined place, in which the cases are discussed and suitable prescriptions given by the clinician. The latter, therefore, correspond pretty closely to our ordinary college or dispensary clinics. (H.)

In France the clinical method of instruction for internal diseases was first introduced in 1780 by Desbois de Rochefort. [The first chair of clinical medicine in Great Britain was established in Edinburgh in 1741, with John Rutherford as its incumbent. A similar chair was founded at Oxford in 1780. (H.)]

Hospitals, during the whole 18th century, were in a very bad condition everywhere, so that "hospital fever" never left them. In the Hôtel Dieu at Paris several patients were still allowed but a single bed. The system of centralization was also still in bloom, so that it was even retained by Joseph II. in the "Allgemeines Krankenhaus", which was supplied by, and composed of, the 17 Vienna hospitals existing up to this time, and was opened Aug. 16, 1784. Yet Stoll and a physician named Fauken pleaded for the better system, and the latter proposed a hospital in the northwestern portion of Vienna, placed upon an eminence, surrounded by gardens, the buildings to be only one story high and provided with wide corridors and doors. Patients suffering from infectious diseases were to be sheltered in separate cottages (Puschmann). As regards the expense of a hospital, it may be stated that the "Allgemeines Krankenhaus" claimed an annual budget of 285.500 marks (9000 marks for installations, 6280 marks for the clinical institution etc.). The first director until 1794 was Quarin, who was succeeded by Melly. [Of the great general hospitals of London, the following were established in the 18th century: the Westminster (1719), Guy's (1723), St. George's (1733), the London (1740) and Middlesex (1745). The Edinburgh Hospital was founded in 1736, and in Dublin the Jervis Street Hospital (1726), Stevens's Hospital (1733), Mercer's Hospital (1734) and the Meath Hospital (1756). These institutions became, naturally, the schools of England's great practitioners. Eminent physicians and surgeons connected with these hospitals attracted numerous pupils, who were at first instructed in the hospitals themselves. But as their numbers increased it became necessary to relieve the hospital wards, and accordingly private institutions for medical instruction were established by the most popular teachers. Such was the origin e. g. of the famous Windmill Street school of anatomy, founded by William Hunter about 1770, and of the private medical school of Sir William Blizard and the anatomist Maclaurin established a few years later. The latter school developed in 1785 into the London Hospital Medical School, the earliest of the great hospital medical schools of London. In the same way the medical school of St. Bartholomew's Hospital was developed in 1790 through the activity, good sense and popularity of the great Abernethy. — These hospital medical schools, as we know, in the present century have quite monopolized the department of medical instruction in England, the universities of Oxford and Cambridge confining their medical teaching almost entirely to the purely theoretical branches of medicine. (H.)]

More and more attention was paid to instruction in the sciences accessory to medicine by the establishment of botanical gardens and chemical laboratories. This instruction was given by the professors of medicine, who at the beginning of the century were still often eminent chemists, physicists &c. In Vienna e. g. a chemical laboratory and botanical garden were opened in 1749. The same was the case in all civilized lands except Spain, where naturally the natural sciences found no admission, and even as late as 1770 no instruction in these branches was given in the famous university of Salamanca. At most, these sciences were taught in accordance with the views of Aristotle, who was likewise the only philosopher tolerated, and thus pure mediævalism lasted in Spain almost down to the present century. Lectures on physics, botany etc., were regarded as dangerous to the purity of the faith. Mineralogy for mining purposes — even the most faithful Christians need money — was alone tolerated, and this science was cultivated in Spain by the Irishman Bowles. (Buckle.) [In Great Britain botanical gardens were established very early, e g. at Hampton Court under queen Elizabeth, at Oxford in 1632, at Chelsea 1673, at Edinburgh 1676 and the Kew Gardens in 1760. Private gardens established by wealthy amateurs in botany were also numerous, e. g. those of Wm. Sherard at Eltham, of Fothergill at Upton in Essex (1762) etc. — Professors of botany were appointed at Edinburgh (1676), Cambridge (1724), Dublin (1785) and Glasgow (1818). — Chairs of chemistry were founded at Cambridge (1702), Edinburgh (1713), Dublin (1785), Oxford (1803) and Glasgow (1817). (H.)]

Matriculation was of course the condition for the attainment of academic citizenship, as it is to-day. It cost for the nobility a greater or less sum, according to their rank. For civilians the price was the lowest, an arrangement which would have been a good one, were it not that they were thereby stamped as an inferior class of academic citizens.

[The ceremony of matriculation in the 17th century may be seen in the experience of John Evelyn at Leyden in 1641. He writes: "I went to see their Colledge and Schooles, which are nothing extraordinary, and was matriculated by the then Magnificus Professor, who first in Latine demanded of me where my lodging in the towne was, my name, age, birth, and to what faculty I addicted myself; then recording my answers in a booke, he administered an oath to me that I should observe the statutes and orders of the University whiles I stay'd, and then deliver'd me a ticket by virtue whereof I was made excise-free, for all which worthy privileges and the paines of writing he accepted of a rix-dollar." (H.)]

After the conclusion of the course of study, which commonly lasted four years, the examination was made by the professors. The youngest professors asked questions first for an hour, and the Dean closed the examination. After this oral examination, two questions, the one on theory, the other on practice, were given to the candidate, who was allowed 24 hours to prepare himself for their discussion. If the candidate passed his examination, he was congratulated by the Dean just as at the present day. Next he was required to write a "dissertation", which was criticised by the President, after which a "disputation" and "Doctorpromotion" (graduation) closed the scene — just as now. In addition, many physicians undertook travels through Germany for purposes of study — these were already recommended by Susruta to physicians, in order to learn foreign diseases and remedies — visiting various mineral springs and savants to acquire further information. The wealthy also went to foreign universities, particularly those of Holland, France and England. The North-Germans were specially fond of going to England, the South-Germans to France. [The same custom prevailed in England, the English students very frequently visiting for further instruction the universities of Paris, Holland and Italy.]

The expense of a university course, even when compared with our present standard, was not always trifling, particularly when we take into consideration the increased value of money at that time. Heim, indeed, for a six years' course of study, required only 1500 marks ($375). His dinner, however, cost him about two cents, for supper he ate about one cent's worth of bread, and he occupied a room with another student. He was poor to be sure. But, on the other hand, when, on one occasion, he smuggled a pound of tobacco, he was compelled to pay a fine of 90 marks ($22.50). At Strassburg, which was regarded as an expensive university, Wieger estimates the expense of a four years' course at 1750–1760 to 3250–3500 marks ($438–875). The Doctorate alone cost, all in all, about 700 marks ($175). In Vienna and other places the expenses of the academic course were lightened by the rector, who gave to certain students "Bettelzeugnisse" (begging-certificates), which authorized them to beg in public.

Medical students at the universities were not permitted to go out without their scholastic cloaks, just as the pupils in the gymnasia are required to wear their student-cloaks, while to-day the student-uniform is worn in Russia alone, and the ancient cloak still exists in Spain. A basis for estimating the number of medical students is given by the attendance at Halle in the days of Stahl and Hofmann. In the first half of the 18th century this university was the most popular of any in Germany. During the period of Stahl's activity here there were altogether 538 medical students educated, or 25 per year. This number had been doubled in the time of Hofmann, and yet it was very moderate when compared with the inundation of the present day. The little university of Giessen has always now more students of medicine than Halle had in the days of the famous Hofmann; Vienna in the year 1880 had more than 800 students. Freiburg 121; Würzburg in the middle of the last century could show at one time only three medical students, though to-day, as a rule, their number is 150 times as many; so that from the very number of our students of medicine in the present day it may be inferred that an internal call to the practice of medicine has very little to do with the adoption of this branch of science. In 1879–1880 there were in Germany 3670 students of medicine; 1880–81, 4405; 1884–85, 7131; 1882–83, in Vienna alone 1750!! In spite of the trifling number of students in the last century as compared with the present day, complaints were still made of too much of a good thing, "by which an educated proletariat was arising". Accordingly in 1791 the Court Commission on Education (Studienhofcommission) in Vienna proposed that the rush for study should be repressed. The same thing occurred too in 1699, and particularly as regards medicine, "for the number of medici especially is very great". (G. Wolf.) This effort to dissuade young men from study was an emanation of the increasing tendency to state oversight of educational matters, which at an earlier period would not have been even thought of.

"The greatest portion of the students belonged too to the privileged classes". In 1761 a decree was published in Austria, providing that the sons of citizens and peasants should be admitted to the universities only when they had manifested a special talent therefor. Even late in the 19th century (as quite generally in the 18th) "in the electorate of Hesse, permission for the so-called lower classes to pursue courses of study was very limited. Noblemen, on the other hand, could study without any ceremony. Yet the larger part of the nobility in Germany could scarcely write". — In Göttingen even so-called "Prinzencollegien" (lectures for princes) were delivered. "Princes and counts are here separated from the other listeners" etc. says Xenion (Schiller). The "Privatissima", customary even at the present day for the highest lords, whose capacity is defective and who do not wish to compromise themselves, are a reminiscence of these "Prinzencollegien".

That drinking and duelling, emigrations of students, street rows etc. played a great rôle in student life, and that, particularly in the small universities like Jena and Giessen, the utmost rudeness prevailed, were remains of mediæval customs, of which, indeed, we still find examples enough at the present day. The students, at the beginning of the century, still wore a sword by their side, and accordingly duels without seconds occurred frequently in the marketplaces of the cities, e. g. in Jena. The beadle interfered characteristically with the Latin cry "Pax! Pax! sub pœna relegationis!", and "Turnvater" Jahn relates: "A special custom prevailed in the fighting of duels in that day. First a student was "aufgebrummt" (i. e. called a "dummer Junge", blockhead), then his ears were boxed, then he was sprinkled with a fluid of dubious character, next he had his face spit into, and the hunting-whip applied — of course with certain intervals — before the duel proper began. The hunting-whip particularly played a weighty part, and unpopular students were heartily blessed therewith. They were assaulted before they got out of bed, and the proposed beating was soundly administered". Fights with journeymen, policemen etc. were not lacking — when our great-grandfathers studied medicine. "The greater part of those who attended the universities devoted the first part of their academic course to learning the brutalities of their elder comrades, to educating themselves in their immoral conduct and to making themselves at home in the technical language fabricated by barbarians. The first half of the middle period of his academic course was occupied by the youth in practising the follies and mischief which he had thus learned, and in its latter half the former pupil became the instructor in vice. The dregs of academic life were devoted to the learned professions. With infirm body, enfeebled mind and exhausted purse, the debauchee now sought with all haste to recall to his recollection enough of his instruction to enable him to answer the necessary questions at his impending examination" — an idea conceived in stupidity! General duels and fracases were an everyday matter (Jahn's life of Euler) — all of which, though considerably toned down, still exists in our own century. — Besides the ancient "Landsmannschaften" (at an earlier period called "Nations", now "Corps"), governed oligarchically and despotically by the "Chargirten", there originated in the last century so-called "Orders" (in the style of the Freemasons), e. g. the "Mopsorden" in Helmstedt and Göttingen (1748), the "Pro patria et fraternitatis amore" in Erfurt and Helmstedt, the "Josephinenorden" in Marburg, the "Concordia et sinceritas" in

Halle etc. The members of these orders wore special colors (colored caps and ribbons) like the "Landsmannschaften", but were strictly interdicted by the officials of the states and universities.

The journey to the university, or from one university to another, was of course made usually on foot. The wealthy only made use of the post and extrapost, both of which from the bad condition of the roads were not free from danger to life. That in these wanderings, and during residence at the inns, numerous vices were contracted is easily understood. On the other hand, however, greater knowledge of mankind and independence of character were gained. The student with his knapsack and heavy blackthorn for protection and weapons was one of the notable figures to be seen on the highroads.

Many students regarded it as no serious offence to cheat the professors out of their lecture fees, or to beg for a reduction in the same without any real necessity. Indeed, it was regarded even as a permissible piece of imposition on the part of a student.

The students' doggerels of some of the universities have preserved to us characteristic views of student-life in that day. Thus

"Wer von Tübingen kommt ohne Weib,
Von Jena mit gesundem Leib,
Von Helmstädt ohne Wunden,
Von Jena ohne Schrunden,
Von Marburg ungefallen,
Hat nicht studirt auf allen."

"In Leipzig ist man Tag und Nacht
Auf Mädchens Putz und Pracht bedacht;
In Halle gibt es viele Mucker,
In Wittenberg Kaldaunenschlucker, (tripe-eaters)
Nur Jena ist von diesen frei,
Und setzt es gleich oft Schlägerei."

"Schlägerei" (fighting), however, might be predicated of any of the universities.

"In Jena weiss man burschikos zu leben" etc.,

in fact so "burschikos" (student-like), that dismissed students, after hearing the sentence of the Rector, sometimes boxed his ears and then fled, in a wagon already waiting for them, to some neighboring territory, where they escaped punishment. Or a "Philistine" (i. e. citizen) was dragged by the ear to the marketplace, there compelled to kneel down, beg pardon and shout "Long life to academic privileges!"

That "Pennalism" had not died out needs no special mention, for even at the present day portions of this system still exist in the "Corps" and associations. The hair of the "Brandfuchs" was singed off in spots with a lighted paper, after which the latter was extinguished upon his cheek. Drinking matches for the position of "Bierpabst" ("boss-drinker", perhaps we might call it), and throwing the beastly, drunken idiots "into the chamber of death" on straw etc. still continued. The students were in general still governed by the special university laws, which were not abrogated until 1870.

An abuse which has now disappeared was that of the "Hutschen". This consisted in the following custom. An elder, ragged student, with empty purse, invited a young student, whose outfit was new, to exchange clothing and purse with him, and the request could not be refused without bringing the new student into discredit (in student slang "in Verschiss"). There was also a higher kind of "Schmollistrinken" (fraternal drinking). — The despised and persecuted "Deutsche Burschenschaft", founded at Jena on June 12th, 1815, began first to oppose these outgrowths of a barbarous age, and to reduce life in the universities to a more polished form. By degrees it has accomplished its aim, so that the German medical students of the present day would certainly be called gentle Philistines by their scholastic predecessors.

The professors of medicine still represented in the person of a single individual a whole row of branches now provided with special chairs. At least this was still common at the beginning of the 18th century, so that e. g. in Vienna there were three, and in Halle only two, medical professors. Stahl, the incumbent of the chair of theoretical medicine, was the teacher of botany, materia medica, dietetics, physiology and the institutes of medicine, while Hoffmann, who represented the practical branches, was professor of physics, chemistry, anatomy, surgery and the practice of medicine. Anatomy, surgery and midwifery were regarded as belonging together, and these branches were usually allotted to the professor of surgery. The latter too lectured chiefly upon the theory of surgery alone, and Haller himself e. g. never carried a surgical knife, and never performed the smallest surgical operation. In the later decennia of the century there were, indeed, in many faculties more than the two professors, who originally existed in all universities. Yet there were still no more than the three professors of medicine, who were generally created for the first time in the 17th century, to wit: one professor of the theory of medicine, one of the practical branches and one of the institutes. With these was associated a fourth, who had charge of anatomy and botany, but enjoyed no salary.[1] The professors often did not lecture. When they were indisposed a notice was simply posted up upon the "blackboard", "Hodie non legitur", and this was the end of the matter, for the professors, outside of Prussia, were still independent of the state (Leo). They were neither under such bureaucratic tutelage as in the stricter oversight exercised at the present day, nor were they so powerful, and so conscious of their power over the students, as they have become by means of the modern system of examinations.

"And when in the course of the 18th century the voice of the age imperatively demanded an increase of the number of teachers and a division of the subjects upon which instruction was given, the existing professors boasted of their jura et privilegia quæsita and shoved aside from their livings and their sinecures the professores honorarios or non decanibiles, newly appointed as teachers of a new departure. This state of affairs existed in Germany down to the beginning of the 19th century, and in some antiquated universities even longer." In addition to medicine, the three professors mentioned above lectured upon botany, and often on physics, chemistry and natural history. "In general it may be taken for granted that the number of professors established by the statutes down to the 18th century was amply sufficient to deliver the required lectures, since independent investigation was rare, belief in the authorities demanded in all things, and the real sciences limited in extent. But towards the close of the 18th century appeared the curious situation that the three nominal professors in the faculty, i. e. those of chemistry, botany and anatomy, neither of them knew anything of these branches. They also looked upon instruction in these sciences as beneath their dignity, and gladly abandoned it to younger teachers without any salary; and as the latter increased in mettle, they also shoved it off upon uneducated bath-keepers and apothecaries, with the idea that the latter would make less pretensions. . . . When new positions became vacant, the existing chemists, botanists, anatomists, and very frequently the bath-keepers etc., stepped into them. If the faculty heretofore had often consisted of Greco-German physicians, who knew (?) nothing of nature, now it consisted not rarely of experts in the natural sciences, who knew nothing of medicine (and the same thing has occurred here and there in recent times). The original object of the faculty, to be a board of examination, which it had up to this time fulfilled and was able to fulfill, was accordingly completely undermined and rendered impossible. The students saw well enough that they did not require to know those subjects upon which they were examined by the members of the faculty, and the examiners knew nothing of what the students had learned from other teachers . . . . the most important branches which the time imperatively demanded, e. g. the natural sciences, remained utterly (?) neglected. Moreover the scholastic form of the examinations of the 16th century was no longer well adapted to the object desired. Hence after the middle of the 18th century complaints were heard on all sides, and we may read those of the one party in the lamentations of Gruner's almanac, those of the other in the grumblings of the Brunonians and natural philosophers. . . . But, even after the intrusion of new teachers, the chief privileges were still possessed only by the old ones, as a rule now the members of the faculty so dead to the demands of the time. . . . The medical men opposed the desired reforms, chiefly on grounds of self-interest; if the effort at imitation and self-preservation necessitated the appointment of a few teachers of the real sciences, the latter found suitable quarters in the ever open doors of the philosophical faculty, already so heterogeneous in its composition. Thus none of the changes demanded by the time were able to secure a place; . . . the tottering head could no longer hold the students, who had become by degrees more numerous, more self-reliant, better prepared and enlightened by the quarrels of the professors, and more independent through the advances of the state. . . Thus these mediæval institutions estranged themselves more and more from the state, and looked into the present like the megalosaurus upon the creation of to-day."

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[1] How matters have changed in this respect the following statistics will show. In 1877 Vienna had in all 146 medical teachers, including 22 ordinary professors — the result of specialism. In Germany in 1877 there was one teacher to every 9½ students! In 1880 there were in the 21 German universities 528 medical teachers (38 per cent. ordinary professors, 26 per cent. extraordinary professors and 36 per cent. "Privatdocenten"). Berlin had 36 professors of medicine, Leipzig 26, Munich 24, Heidelberg (with about 121 students of medicine) 21, Breslau 20. The medical faculties are the best supplied with teachers. That one man, under certain circumstances, accomplishes more than a great number of average teachers — and what land can have at the same time only (or very many) eminent teachers? — is demonstrated by the example of Boerhaave, Haller and others.

To this sad picture of the faculties of the last century, sketched by K. F. Heusinger (1792-1883), professor in Marburg, corresponded here and there the position and management of the German professors. Frederick William I., as Joh. Jac. Moser relates, on the occasion of a visit to the university of Frankfort-on-the-Oder, had a public disputation on the subject "Vernünftige Gedanken von der Narrheit", prevented, in accordance with the advice of Morgenstern. According to a Prussian ordinance of

1733 too, the professors were not permitted to accept a call to another place under penalty of severe punishment. The same rule prevailed in Saxony as regards Leipzig and Wittenberg. "When the university of Göttingen was founded, and the famous professors Hamberger and Wedel in Jena had accepted the call extended to them and were preparing for their departure, an attachment was issued upon their property." (Rohlfs.) In Prague the magistrates let the college buildings go to ruin, so that the professors could only lecture in their own residences. This was as early as 1715, and it was not until 1751 that the buildings were restored. Could any other treatment, however, be expected from the omnipotent state, when even members of the Berlin Board of Health (1709) required that those who died, even of the plague, without taking any medicine, should be hanged therefor after death in their coffin?

In order to look at such things in their right light, we must remember that in the 18th century, during the mania for the universal introduction of better conditions, during the omnipotence of the state which prevailed before the French revolution and the universal assumption of the most limited intelligence on the part of subjects, the greatest enormities were committed, even with the best intentions. This was done by even distinguished rulers. Let us think only of Joseph II., who, in the ordinary sense of the term, was none too virtuous, and who desired to reform the world almost entirely by laws and ordinances; just as the German empire to-day wishes to reform church matters, though they can be fundamentally reformed by the school alone.

The external situation of the professors, at least in the more important universities, was generally not very bad, nor were their salaries so very small. We may assume as the average for the North-German universities 3000–7500 marks ($750–1875), to which are to be added the professorial fees. In Austria the salaries of professors were specially improved by van Swieten. De Häen received 10,000 marks, and Frank, at a later period, 9000 marks. In the smaller universities the salaries were undoubtedly bad enough, frequently not 170 marks per annum, and examples of such salaries were to be found even during our own century. These amounts must, however, be estimated 3–5 times higher than at the present day, in accordance with the value of money at that period. The university professors were reckoned among the so-called state officials, though not in the highest class of these, even if they were also physicians-in-ordinary, a thing which was more frequently the case in the last century than at the present day. It makes a patriarchal impression upon us, however, when we read the domestic calculation of the first German professor of surgery given below, and see from it that he was compelled at the close to boast of his knowledge, probably to obtain more readily the fulfillment of his modest wishes. Living too, at least in North-Germany, was relatively dear. Thus Zimmermann e. g. computed that he would require 6000 marks annually in Hanover, and Werlhof reminded Haller, when the latter was called to Berlin, that with the demands made in that city for domestic arrangements etc., 7500 marks would not go very far. The average German professor of that day was generally compelled to be satisfied if he was able to procure a simple living for his family, to beget and bring up his children and pay for his books. The scanty lecture-fees resulting from the small number of the students did not much improve the matter (we read a good deal of the sale of degrees, the fabrication of dissertations and corruption in the examinations), although the fee for a course of lectures was sometimes half as much, sometimes quite as much, as it is to-day, and the value of money (at least three times as much then as now) must also be taken into consideration. Accordingly the German professor of medicine in that day, quite in contrast with many medical and other professors of the present time, made very little out of his scientific knowledge, while in foreign lands genuine mountains of gold were at the beck of the professors, who died, or might have died, very wealthy. When e. g. Morgagni received 5000 marks; when van Swieten was offered a salary of 20,000 marks in England; when Boerhaave, who received at first a salary of 850 and then of 1700 marks, by his private practice made millions, and when the more considerable French and English physicians acquired very respectable fortunes in the same way, we hear nothing of this sort regarding German professors; but we read, on the other hand, that they took students to board, wrote books which paid them very badly, made translations or, like even Stahl and Hoffmann, drove a trade in proprietary remedies. Kurt Sprengel, as ordinary professor in 1795, received 174 marks, and subsequently, when he taught several branches, 450 and 1200 marks. All other countries, however, were richer than poor Germany, ravaged during the 17th century by the dreadful Thirty Years' War and the wars of Louis XIV. waged by his incendiary generals Louvois, Turenne, Mélac and others, and in addition defrauded on the Rhine in particular of her prosperity and her free development. And it was not until towards the end of the 18th century that the traces of this suffering (not, however, the unpractical nature of the Germans) became somewhat obliterated.

When Heister was about to be called to Göttingen he wrote as follows: "In Göttingen everything is more expensive than in Helmstädt. There a cord of wood costs 4 thaler, in Helmstädt only one thaler and 12 good groschen; I consume 50 cords of wood annually, so that wood alone would come 100 thaler dearer. Again most kinds of meat cost there 18 pfennige to 2 good groschen, while in Helmstädt they cost only 12 pfennige, which stands to me for an increased expense of 50 thaler. Moreover beer as well as rye is more expensive there than here, and thus I should be as well off with my salary here, as with one of 1000 thaler there. I beg leave to commend these reasons to the consideration of his Excellency Herr Münchausen, in order to determine whether, by reason of these circumstances, the salary cannot be increased a few hundred thaler. Doubtless another professor can be procured in my stead, but I will wager that one cannot be easily obtained equal to me in anatomy, surgery and botany, besides the chief branches of medicine; still less one superior to me" —

and Heister remained at Helmstädt! [It may be inferred too that in England, at least during the early portion of the 18th century, the salaries of medical teachers were by no means magnificent. Thus when in 1677 the lecturers of the botanical garden in Edinburgh were organized into a College, James Sutherland as president of the new college received a salary of £20, and in 1705 Robert Elliot, the first professor of anatomy of the college, was paid by the city authorities the noble sum of £15 annually! This too almost at the period when Mead was making a magnificent fortune by his private practice! (H.)]

That unanimity was often wanting among the professors, and that, on the contrary, vanity, envy and strife, abuses regarding degrees, the acceptance of gifts etc., prevailed in many places, should not be surprising, since similar things have been mentioned (often unjustly) even in our own day. But it is surprising that it was considered wise to insert a special paragraph on this subject in the statutes of the faculty. (See paragraph 8 below.)

STATUTES OF THE MEDICAL FACULTY OF FRANKFORT-ON-THE-ODER FROM THE YEAR 1769.

1. Each ordinary professor, when newly appointed, shall on his admission pay 12 thaler and take an oath not to deviate from the statutes.

2. After reception into the Faculty he shall not share in its emoluments, until he has himself held lectures and demonstrations in his official capacity.

3. For the examinations and annual graduation[1] the candidates shall pay 48 Hungarian or Dutch ducats (about $2 00 each), and one thaler for the stamped parchment. Of this sum 15 ducats and 18 groschen, or 42 thaler, shall be divided equally among the members of the Faculty, who are not Deans. The remainder of the money shall be retained by the Dean; wherefore, however, he alone shall pay all expenses except the printing of the dissertation, e. g. those for the royal confirmation, for the library, for the secretary, for the servants of the university etc.

4. When the Faculty shall voluntarily remit some of the expense to a candidate, it shall be done in accordance with the unanimous views of the two professors, and

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[1] That the Doctors' Oath was administered with ancient solemnity, that banquets etc. followed, need only be mentioned. Graduation took place, on the whole, with the same ceremonies as at the present day; the solemn march of the candidates headed by the mace-bearers, with the "Paranymphen" (boys with lighted candles) at the side (the latter now omitted) carrying the insignia of the doctor (hat etc.); behind, the professors according to rank in the "goose-march", with the Dean at their head. The Dean then took the upper seat in the double pulpit, the candidate the lówer, while servants bearing maces stood on either side. After the reading of the "Oath" the maces were crossed and the oath administered to the candidate, who held his forefinger upon the mace. First came a disputation in the presence of all the medical (and other) professors, and in which the students raised objections. The diploma with its seal etc. followed. In certain universities the oath contained the obligation that the physician should take care that the patient should receive the sacrament, a clause reintroduced in the Roman Catholic university of Louvain in 1880 ("eos qui quarto die morbo acuto decumbunt, moniturum est, ut rebus suis spiritualibus et temporalibus provident.")

shall not exceed the sum of 24 thaler, of which two thirds shall be deducted from the Dean and one third from the other professor.

5. Of all other emoluments, except those resulting from legacies (which accrue to the Dean only), two thirds shall go to the Dean and one third to the other colleagues, e. g. the honorarium for medical decisions, public certificates.

6. The candidates for the summi honores are received into our Faculty.

7. When an opinion is requested, the Dean shall present the question to the meeting of the Faculty, give his own vote, demand that of his colleagues, and draw up the opinion. If a difference of opinion prevails, the Dean gives the casting vote.

8. All disputes should be avoided, and not referred either to the king, the minister or the Curator, in order that our Faculty may escape disgrace.

9. In witness whereof follow the signatures of us two, who constitute the aforesaid Faculty.

Done at the meeting of the Faculty held June 15, 1769.

CARTHÄUSER. HARTMANN.

(1704–1769), professor of anatomy,
botany and chemistry, and an
important pharmacologist.

The Faculties, all whose actual power slipped away during the 18th century, formed, as at an earlier period, a supreme tribunal for the settlement of disputes between the judicial authorities and the physici. From them "Superarbitrien" or supreme judgments were sought, and in the following extract we find a very notable example of one of these judgments.

ATTESTATUM MEDICI ET CHIRURGORUM AND SUPERARBITRIUM OF THE FACULTY

concerning a maid-servant who died suddenly after having flown into a passion with her fellow-servant, and having on the same day received from the latter some sharp blows upon the ear.

The Physicus med. Dr. Christoph Siegmund Astmann and the surgeons Andreas Slutius and Joh. Wilh. Winckelmann had testified from the results of the post mortem examination — musculus crotaphites uninjured by the blows upon the ear, hence the cranium was not removed; on the other hand, the pylorus stomachi all stained yellow; the intestinum ileon and jejunum, one lobe of the liver, the mesenterium, together with the intestinum rectum, all brown and black; within the intestine were hardened fæces, which in consequence of the great inflammation could not be discharged and there was also great obstruction in the (urinary) bladder; in the cavity infimi ventri was a bloody, partly watery and slimy matter; the stomach was entirely empty from vomiting, and the tunica infima quite filled with black spots and grains — that it should be concluded "that the abdomen had been injured by kicks and blows, if not with sharp or poisonous things, and that gangrene as well as sphacelus had ensued" etc. The juristic faculty now demanded a superarbitrium of the faculty of medicine in Frankfort, and the latter decided "that in consequence of the wordy dispute and passion an effusion of bile and severe colic had ensued (especially as the deceased, the day after the wrangle, had complained of a tearing and cutting sensation and had vomited, had become obstructed thereby, and on the very day of the quarrel had complained of chilliness, had been also before this a sickly person, had used ginger and brandy, had consulted no physician, drunk cold "Dumper" or small-beer, eaten cabbage, taken cold etc.), that then the affectum colicum had been irritated and undergone an exacerbation, and that finally ab acrimonia bilis caustica not only the interna ventriculi tunica had become eroded, but together with the pylorus etc. had taken on gangrene, as the only result of which speedy death must follow. This our opinion, fixed and grounded in arte medica, we confirm with our signature and the seal of the Faculty. Frankfort-on-the-Oder, May 29, 1723." In this decision the clinical view defended by the Faculty against the collegium medicum completely proved its superiority over the purely anatomical explanation, as has been the case too since this period. Thus this decision has a certain value for the present day, which in many respects defends views similar to those of the physicus Astmann.

In France the 18 Faculties — the medical faculty at Paris up to this time consisted of only four professors who were chosen by lot every two years, and accordingly, under certain circumstances, exchanged positions, while the medical faculty of Strassburg had only three professors — were abolished by vote in 1792 (as a matter of fact, however, not until 1794), and in their place was established the École-system.

The "democratic" institution of the "Concours public" was introduced as follows: 1. Concours for the "Externat" in the hospitals; 2. Concours for the "Internat": 3. Concours for the position of hospital-physician; 4. for the position of professor agrégé (assistant or extraordinary professor); 5. The position of ordinary professor, now assigned by the Minister of Instruction with the aid of the Faculty, was also given by concours at that time, and again after the revolution of July until the restoration of the Second Empire. The title of "Doctor" was abolished and that of "officier de santé" alone employed. The former title was, however, re-introduced in 1808, though the latter has also been retained until the present day to designate an inferior class of physicians. Evidence of preliminary education was omitted. Practice was to be entirely free without the necessity of any preceding examination or diploma. The latter was restored in 1803. Of course the Bourbons, after the banishment of Napoleon I., or after 1821, abolished the concours etc.

The earlier arrangement by which the students also gave instruction no longer existed. In fact this had gradually outlived its usefulness even in the 17th century. Accordingly the preliminary grades of Baccalaureus and Licentiate were gradually combined with the final grade of Doctor. In the place of the former appeared the peculiarly German institution of "Privatdocenten". Still neither the number nor the longevity of the latter was nearly so great as at the present day, as may be readily inferred from the limited number of professorial positions. Thus e. g. Reil was a private teacher for only a short time before he became ordinary professor. Hence the "Privatdocenten" of weak mind or character were not yet placed in a false position requiring them to proclaim the fame of their superior professor in order to finally secure his place, nor as "candidates" to fawn upon their superiors and seek recruits among their inferiors, or to marry spinster daughters in order to secure their future career. Many teachers, immediately after the conclusion of their studies, stepped into the position of an active professor, or practised either in a university city or elsewhere until called from this position to a professorship. In this method hospital practice could not become the predominant style, and the teachers needed to be well-schooled practitioners, not simple savants or experimental therapeutists. What we now call the venia legendi was still included in the attainment of the grade of "Doctor".

The Latin language was still generally employed for purposes of instruction, at least by the professors of medicine, while most of the surgeons lectured in German. [As already mentioned, Cullen was the first professor in Great Britain to deliver his lectures in the English language. This was about 1770. (H.)]

It was in this century too that the profession of the physician became for the first time substantially a secular one, inasmuch as the priests now gradually withdrew entirely from it, and only a few isolated individuals devoted attention publickly to lithotomy at most.

In the place of clerical physicians, now entirely excluded from ordinary medical practice, the 18th century introduced Jewish physicians as fully authorized and active members of the class of medical practitioners.

This movement began in France in the year 1791, when the principle of the equality of all men before the law, whatever their position or religious belief, was decreed, and spread thence in the course of the 19th century over the whole civilized world, though even to-day it is not carried out thoroughly to its final and logical results. Heretofore the Jews had enjoyed only such rights as were granted them by favor or as a privilege. In Berlin e. g. they were allowed to enter and leave the city by one gate only, and they might be expelled at any hour. In most cities they lived in Ghettos, were permitted to transact only monetary and other usurious branches of business, and of studies that of medicine alone was allowed them on the receipt of special permission. They spoke a Hebrew-German jargon, could not write German, and, indeed, were forbidden to learn how to write it by the rabbis under penalty of excommunication. In Germany Moses Mendelssohn (1729–1786) was the pioneer in the introduction of an actual German Judaism. Even under Frederick the Great the Jews on marrying were still compelled to purchase porcelain from the royal manufactory; nor were they permitted to select for themselves, but they must let some one allot it to them. Thus Moses Mendelssohn e. g. was compelled to buy 20 life-sized porcelain monkeys, which are preserved as memorials in the family down to the present day. Jewish physicians were now also permitted to treat Christians (as, indeed, they were in many places during the Middle Ages), while in the first three centuries of the modern era the practice of medicine was, as a rule, allowed them only among their fellow-believers. Among the latter there was always one physician in each city. Educated Jewish physicians were few in number and exceptional in the so-called modern era, since attendance upon the universities was ordinarily forbidden them, though as we know it was permitted in Salerno, Montpellier etc. In Austria the prohibition of university education to Jews was not removed until the time of Joseph II., and Beer in 1789 was the first Jew who graduated in that kingdom. —During the Middle Ages the Jewish physicians very frequently attained considerable wealth, as e. g. the Jewish physician Jacob of Strassburg, at Frankfort-on-the-Main in the 14th century, who paid a tax of 53 marks annually, a sum equal to at least 530 marks at the present day. He was accordingly reckoned in that day among those who paid the highest taxes in Frankfort, and in this same list were fourteen of the sixteen Jewish families who resided in Frankfort in that century. The Jews enjoyed the sole right, however, of letting money upon interest, a business regarded in the Middle Ages as unchristian, though no longer so considered. The rate of interest at that period was often very high, even as much as 200 per cent. In 1657 even the most skilful Jewish physicians were prohibited from practice, and it is said when a certain Herr Hirsch, a regularly graduated Jewish physician, in consequence of his rare experience and skill sought to pass toll-free throughout the whole land of Würtemberg — a region, which, as the result of historic propagation, has remained down to the present day the home of numerous "Zionswächter" (guards of Zion) — "all the clergy protested with the greatest vehemence against this privilege, declaring it would be better to die with Christ, than to be cured by a Jewish doctor with the aid of the devil" (Lammert).

Throughout the whole century too physicians were everywhere carefully divided into the two classes of physicians proper (medici puri), who studied for four years, and surgeons, who were instructed for two or three years. Both classes possessed very distinct privileges, and it was not until quite the close of the century that this distinction was somewhat relaxed.

The so-called higher and highest classes did, indeed, look upon the physician as a kind of servant — they and the rich financiers, merchants, and such like, do the same thing to-day — and of this even the famous physicians Zimmermann and Heim complained. The former said "The ladies who have sipped coffee with George II. are of the opinion that I should be at their command as I am required to be at that of the king himself", and Heim left his position with the princess Amalie (well known through Trenck's fate), who in return for an annual salary as her physician-in-ordinary of 600 marks, felt at liberty to treat him like a rascal, a piece of impertinence which his energetic and democratic nature would not endure. The better class of physicians accordingly respected themselves in their profession, and thus extorted finally a more complete respect on the part of the laity than has ever been the case either before or since.

Professors were often the physicians-in-ordinary of princes, as e. g Stahl, Hoffmann, Hufeland, de Haën and others.

In imitation of the French court, whose king possessed a faculty of physicians — 48 physicians, surgeons, apothecaries etc., of whom the first two ordinary physicians were required to be present when the king arose in the morning — almost every prince of any importance had a little squad of physicians-in-ordinary. For the supply of this class the court-physicians (Hofmedici) were held in reserve, and the office of the latter was frequently merely titular and honorary, something like our court-confectioner and court-tailor. Wichmann e. g. was a court-physician without salary for 23 years. The salary of the physicians-in-ordinary was usually not very high. Peter Frank, as ordinary physician of the bishop of Speyer, received 1370 marks, a house and board free, 2000 litres of wine and 2200 kilos. of corn. At an earlier period he received as court physician of Baden a salary of 342 marks and the title of "Hofrath". On the other hand, he received from Russia, where he was for a long time imperial physician-in-ordinary, a pension of 9600 marks. Famous physicians served to increase the glory of their lords, and thus the latter vied with each other in securing the services of such physicians by the offer of fixed salaries. The brilliant empress Catharine II. of Russia was of course able to outbid all other potentates, even in the pay of her physicians. For instance she had Zimmermann offered a salary of 30,000 marks, and on one occasion paid Dimsdale for some successful inoculations 40,000 marks for travelling expenses. 200,000 marks as an honorarium, a pension of 10,000 marks for life, and conferred upon him the title of physician-in-ordinary and a barony to boot. The frugal Joseph II. too gave doctor Guérin, who three days before his death had come to a consultation from Paris to Vienna, an honorarium of 171,000 marks and also conferred upon him a barony. Of course these were exceptional cases, but they prove how medical services were estimated in comparison with preceding times. Ordinary physicians too during the last century not rarely attained very great influence upon the course of medical, and indeed of general, culture, and they generally employed this influence in a laudable way. We may refer for examples to Werlhof, van Swieten, E. Conr. Holtzendorff (1688–1751), Görcke, and, with some limitations, to Brambilla and others, who must, therefore, be classed among the reformers of the medical profession in Germany.

Some of them had great influence upon the formation of medical colleges and medical ordinances. The latter, although they laid the basis for an excessive tutelage over physicians, were generally wholesome, and, indeed, at that period even a necessity, in order to eradicate quickly and thoroughly the disorders descended from earlier times and the mischiefs of mediævalism. It was these ordinances chiefly which helped to free the medical profession from excrescences and practitioners without any vocation for their business, and they were directed in the most outspoken way against these particularly, and in a less degree to the tutelage of physicians proper. It was undoubtedly a bad feature of these ordinances that they did not follow quickly enough the development of new relations, and did not conform quickly enough to varying conditions and the changing spirit of the age. Accordingly they resulted in preserving the existence of antiquated conditions, and thus became a drag upon the development of the relations of the medical profession. More especially they occasioned physicians to remain in a material point of view behind the other professions, and were an actual detriment to them.

The following medical ordinances made their appearance: a renewal of the medical edict of the electorate of Brandenburg, which appeared in Prussia in 1725 with the old rate of fees; the "Generale wegen Remedirung der Gebrechen im Medicinalwesen" of the electorate of Saxony 1768; a renewed medical ordinance for Hesse-Darmstadt, 1767; "Instruction für Physiker in Preussen", 1776; an ordinance for Westphalia, 1784, Hanau and Switzerland, 1785, Baden 1793, Hesse-Kassel 1778, Lippe-Detmold 1789, Denmark 1798, Hungary 1786, Sweden 1756 etc. etc.; in fact there were as many ordinances as there were petty states, and by them the coup de grace was finally administered to that liberty of emigration which had heretofore prevailed among physicians. Prussia, which took the lead in all bureaucracy and in 1725 was the first to introduce examinations by the state, made the beginning. *The laity were presidents of the colleges.*

In order to give the reader an insight into the style and spirit of these ordinances and the divisions of the profession at this period, we introduce the Prussian medical edict of 1725.

General Medical Edict and Ordinance, revived Sept. 27. 1725.

The College shall consist of, and be supplied by, our acting Hof-Räthen, Leib- and Hof-Medici here in Berlin with the Physicus ordinarius and the oldest practitioners of our residences. . . . Our Leib- and General-Chirurgus also, as well as our court-apothecary and two of the most skilful surgeons of the guild in this place and two experienced apothecaries shall be received as assessors.

In every province there shall be a Collegium medicum, consisting of a Kriegs- and Domänenrath as a directorium, two medici, two chirurgi and two apothecaries, who shall examine conjunctim all surgeons, apothecaries, bath-keepers and midwives in that province. No medicus shall be admitted who has not taken his cursum anatomicum in the theatrum anatomicum at Berlin, and no apothecary who has not made his processus pharmaceutico-chimicos at the same place (State instead of a faculty examination). These colleges shall maintain communication with the superior collegium in Berlin.

The Medici

are exhorted to concord among themselves, and are sworn to treat the poor gratis. They are expected to live honorably and temperately, in accordance with the noble creature entrusted to their care, should not be envious of each other, and least of all defame and depreciate each other and in consultations they must come to an agreement.

The Physici in the country and cities must present themselves in Berlin and complete a cursum medico-practicum, take the cursum anatomicum, and may not be sworn until they have passed their examination (Physicatsexamen).

The treatment of internal diseases belongs to the approved medicinae doctores alone; on the other hand they are not allowed to dispense medicines. Private arcana or remedia specifica of a physician must be first tested, and may then be sold in the pharmacies for a reasonable price or prescribed for his patients by the physician.

In remote or small places where no medicus can subsist, the surgeons or apothecaries may treat cases of internal disease which occur, but must not administer powerful drugs. They must avoid purgation, the administration of emetics, emmenagogues, opiates, narcotics and severe salivation.

The medici must not recommend one surgeon or apothecary before another.

Physicians must not desert their residences during the prevalence of the plague or epidemics, but need not go into infected houses unless ordered as Pest-Medici.

Whereas experience abundantly teaches that the medici, chirurgi and apothecaries are not always rewarded for their trouble, their bills take precedence of all others.

The tariff of fees does not tie the hands of gentlefolk and the wealthy.

Of the Chirurgi.

They stand subordinate to the Collegium. They are required to have served an apprenticeship of seven years, to exhibit a proper indenture, to have served also in the army during this period and to have passed an examination before the Physicus. Then they must present themselves before the Collegium and perform a cursum operationum in the theatro anatomico. Finally they must take the juramentum chirurgicum. Only those who have taken the cursum operationum can call themselves Chirurgi and Operatores.

In Berlin only 20 German and 6 French chirurgi are allowed in addition to the Hof- and Leibchirurgi.

All unnecessary banquetings and preparations of plasters and salves, with the punishments therefor, are abolished in all associations and guilds of the surgeons. On the other hand, a surgeon who is to be newly admitted shall pay 20 thaler, and an incorporated surgeon 10 rixthaler, to the Instrumentum chirurgicum, and these instrumenta shall be arranged by the guild of surgeons.—The discipuli shall be required to attend diligently the lectiones publicas in the theatro anatomico. Before they are dismissed the apprentices shall be examined upon these lectures.—External treatment may be practised only by the surgeons approved by the collegium medicum. They shall live soberly etc., and in times of the plague or other epidemics, which God avert, let them go into the lazarettos when ordered to do so.—The guild-surgeons must give information concerning dangerous and severe wounds. — In case they are called in for examination by the physicus or a medicus, they must give true evidence.—The treatment of internal diseases is forbidden to them; even in severe accidents a medicus shall be called in to external wounds. — Mercurial treatment without the knowledge of a physician is forbidden to the surgeons, and in like manner untimely venesection is prohibited under severe penalties.

Of the Apothecaries.

Apothecaries before settling down must submit themselves to the collegium, must bring with them indentures and other attestata, must have served at least seven years, must submit to an examination by our professor chymiæ practicus and court apothecary, and must then complete publickly the processus pharmaceutico-chymicos. After the completion of their examination they are to be sworn. — In Berlin there may be nine German and three French apothecaries.—They shall strive to fear God, lead a sober and temperate life and behave uprightly, peaceably and obligingly to everyone; particularly must they avoid fostering jealousy and discord among themselves, and they must carefully collect, preserve and dispense their drugs. — The venena must be kept locked up and separate from other medicines. No poison shall be sold to the laity without a certificate. — Internal medicines, not prescribed by the medicus, must not be prepared. Where, however, recipes are marked statim, cito, citissimo, they must be prepared before all others. — They must not recommend any one medicus in preference to another. — The apothecaries must not prescribe, treat patients or dispense medicines without prescriptions from the medici. They may, however, supply off-hand "Edel-, Hertz-, Kinder- und Präcipitantz-Pulver", as well as gentle laxantia and lenitiva, like manna, cassia, tamarinds, senna, rhubarb and its syrup in moderate doses. On the other hand vomitoria and other purgantia, as well as menses moventia ex Mercurio and Antimonis præparata and opiata, especially philonium romanum, requies Nicolai and particularly Bezoardica and Sudorifera, must not be sold under severe penalties. — Inspections must be made at least every three years, half the expense of the same to be borne by the apothecaries and half by the city treasury. All questions regarding the remedies prescribed must be answered at the request of the physicians.

The Grocers

must sell nothing but esculenta. They are to be sworn like the chemists, distillers and book-keepers, who sell medicines. The shops of the grocers are to be inspected with the aid of the apothecaries twice a year. The grocers must receive no apothecaries' apprentices into their business or guild under penalty of a fine of 100 thaler. Booksellers, printers, confectioners, merchants, traders etc. must not deal in medicines. The same holds with respect to many male and female characters, who understand nothing about medicines. Grocers' shops etc. must not set up the signs of apothecaries.

Of the Bathers.

Bathers and bath-keepers shall not establish a bathing-house, or purchase one already licensed, until they are examined. They may treat neither external nor internal diseases.

Of the Midwives.

They must be examined by the Collegium medicum or the provincial colleges. They must learn from the professor anatomiæ at the theatrum anatomicum (the hobby!) to know upon the dead the nature and structuram partium genitalium. They must be Christians and temperate, not envious of each other etc. In difficult cases they must call in a medicus or chirurgus. They must not treat either internal or external diseases, in either married or single women. They must not specially recommend any medicus or chirurgus or apothecary.

Mountebanks and Dentists.

Moreover the itinerant herniotomists, dentists and root-sellers who travel about to the annual fairs, shall not be allowed in our cities to expose their goods for public sale unless provided with a license. Even in the latter case they must procure their medicaments from the pharmacies.

Studiosi medicinæ etc.

Studiosi medicinæ, preachers, chemists and their assistants, distillers, rummagers of all varieties, Jews, shepherds, doctores bullati,[1] old women and exorcists are not permitted to practice medicine.

Executioners.

The internal and external treatment of diseases is prohibited to these.

Water-sellers.

The sieve-makers who travel through the country, Thuringian water-sellers and Olitaeten-peddlers[2] shall be deprived of their medicines, punished corporeally and banished.

Berlin, September 27, 1725. Fr. Wilhelm.

Against this medical edict the Faculty of Frankfort remonstrated upon the following grounds:

1. According to the edict of 1685, both professors were members of the college.

2. The Collegium medicum prejudiced the privileges which had existed prior to those of the Collegium medicum at Berlin, and according to which the professors had to examine the physicians, apothecaries, barbers and midwives, to visit the officinæ of the first-mentioned, and to approve the appointment of physici.

3. It had been earlier settled that he who had studied and graduated at Frankfort should be appointed to the physicate for other places in this country, and the Faculty was authorized to fill such vacancies as might occur. Now, however, this arrangement was set aside. The king should therefore command the Collegium medicum not to prejudice further these privileges; for by the decision that every one who wished to practice in these lands and who had been graduated as a Doctor medicinæ at Frankfort must have an Attestatum from the Collegium medicum that he had been examined by this and had completed his cursum anatomicum, such an injury was inflicted. For the professors would be deprived of their graduation fees, although they devoted some years, and mostly gratis, to the instruction of their studiosi medicinæ. The fides of the Faculty was suspected. The professors became mere

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[1] See page 566, note 2.

[2] Olitaeten were all kinds of oils, essences, perfumed waters etc. One of the most popular of these was the "Krummholzöl", oil of the mountain pine, which was regarded as a specific for tooth-ache. (H.)

officials of the Collegium medicum. Moreover they dared affirm that the most skilful anatomist might be nevertheless the most miserable of practitioners and scarcely able to cure a tertian fever or other still more trifling disease, while one well informed in the true theoria medica, which is derived from praxis clinica, and a candidate from the university well instructed in the correct historia morborum, would be far more capable than another who might have received complete approval from the Collegium medicum, because he had completed his cursus at the theatrum anatomicum in Berlin. "Indeed, as regards this point, we may add that the anatomy of the present day deals chiefly in subtilties, unprofitable and highly injurious and prejudicial to true praxis clinica, and that if a candidatus medicinæ knows it, it is about as profitable to him as regards his scientific praxis clinica as the ars poetica or pictoria, since it merely gives him occasion for delusive indicationibus." The Faculty also teaches anatomy and allows no opportunity to escape of getting subjecta humana; these we can get none for less than 10 to 12 rix-thaler. But in the lack of these our auditores practice diligently in sectionibus brutorum."—Double expenses accrue to the candidates at Frankfort and Berlin. All this is in violation of the effectus promotionis publicæ, since by the actu promotionis, in accordance with the imperial and electoral privileges, authority is imparted to the graduated Doctoribus to exercere Praxin throughout the whole Roman Empire. This authority now comes to nought. —The Collegium medicum receives general sovereignty, and yet practitioners licensed by it have been extremely ignorant, including among them even some Stadt-Physici, though the examination of the latter the Faculty is willing to concede as useful to the state. The Faculty is losing money etc.

'Frankfort-on-the-Oder, March 21, 1725

Your Majesty's most obedient and dutiful Servants etc.

To this protest the Faculty received the following cutting reply:

"The arrangement was not made, according to the imputation of the Faculty, for the purpose of injuring them. They are still at liberty to correspond with the Collegium etc., but his royal Majesty, as the highest Collator, holds himself bound by no privileges, when he knows it to be salutary for the common weal to alter or abridge them. The reasoning which the petitioners undertake to introduce in their memorial regarding the royal anatomical and surgical institutions here and their most gracious and established arrangements, is partly impertinent and partly so constituted as to awaken no special opinion of the science and experience attained by the petitioners in arte medica, seeing that almost innumerable diseases are of such form as to be recognized only by an exquisite knowledge of anatomy, and still less to be cured without such knowledge, and the principium that such an exquisita notitia anatomiæ is not absolutely necessary to medicis is the more dangerous because if the Studiosi Medicinæ are led by it to neglect the studium anatomicum they not only remain mere bunglers in arte medica and may be at most looked upon as Empirici etc. The petition moreover merits not the least reflection in consequence of its trifling objections. The Faculty must live in accordance with the ordinance and likewise in the future refrain from offensive epistles and from the partially false and baseless allegations employed in different places of their memorial, or certainly expect the punishment due to their obstinacy.

Sign. Berlin, Sept. 30, 1725.

By his Royal Majesty's special command

We observe that politeness was not precisely the reigning characteristic of the correspondence on either side — on the contrary quite the reverse. At the present day such "renitent" professors would be dismissed in short order. It should be emphasized to the credit of the Faculty that they entered the lists so vigorously in behalf of the ancient freedom (Freizügigkeit) of physicians.

In the 18th century the "Physici" first made their appearance as state physicians, regularly distributed and in limited numbers, representing state officials with permanent duties, while heretofore they had been rather city appointees, or at least had not been distributed in accordance with a definite system over an entire province. The latter arrangement began in Prussia as early as the end of the 17th century, when the great Elector in 1685 published his medical edict, which united to his marvellous, strict and bureaucratic machine of state a public health department controlled by the police. This system was subsequently imitated by other states. The salary of a "Physicus" generally ranged between 685 and 1025 marks ($171–256). In Prussia one's capacity for the office was decided by a state examination; in other states chiefly by the connexions of the candidate, then his character and behavior.

This imitation of Prussia was particularly marked in Russia, which occupied relations of old and hereditary friendship with that country. Even in the charter of the Berlin "Societat der Wissenschaften", founded in 1700 on the pattern of the English society, it is said: "It is well-known in what a good understanding we are with the Muscovite Czar. Since now the same . . etc., we will be mindful how, therefore, as occasion offers commerce is cultivated and convenient arrangements made with this monarch, so that from the boundaries of our land as far as China useful observations etc. are made."

The following report was also made out in 1786 for the Russian officials, and may be of service in giving us an insight into the further development of state-medicine in Prussia.[1]

Medical Arrangements in Prussia in the Year 1786.

I. The Superior Collegium medicum (founded 1685).
II. The Collegium medico-chirurgicum (founded 1719).
III. The Superior Collegium Sanitatis (founded 1719).

I. The Superior Collegium Medicum.

This in 1734 received a special Director, beneath whom were five medical associates, including the Berlin "Staatsphysicus", a syndic and a medicus from the French colony, 2 assessors of pharmacy, 2 of surgery, 2 medical fiscals, one secretary, a registrar, one chancery clerk and one messenger.

The Medicus who desires to practice in Prussia,

must hand in 12 copies of his Disputation, as well as his diploma, and mention what universities he has attended. He can then take his cursum anatomicum (6 demonstrations upon arranged preparations). Next he receives a casus medico-practicus to discuss in Latin, which task must be accomplished in four weeks, and he must swear that it is his own independent work. If successful in these requirements he is then permitted to practice.

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[1] It is interesting to observe the German proclivity of Prussia, which Frederick II. subsequently set entirely aside. It is said (1700): Care must be taken "that the ancient and original German language may be preserved in its natural and fitting purity and independence, and that an absurd "Mischmasch" and nonsense does not finally arise therefrom" etc. Faith likewise played its part. The Society, through the investigations to which it gave occasion, was by means of the amber "to light the light of Christianity and the pure Evangelium for those barbarous people . . . in which we have the advantage over other Christian potentates that we alone possess the amber and also those wares, which, among all those of Europe, are ordinarily desired and highly prized in China." Proselytism by means of amber was at all events milder than the favorite means of Charlemagne 1000 years earlier — the sword!

A Chirurgus (surgeons and bath-keepers were united in 1799)

must prove that he has studied surgery for three years and has served seven years, or been a "Feldscheer" in a regiment. He must perform in public two anatomical demonstrations and six surgical operations for the city, and if successful in these he must still pass an examination. Surgeons who pass a mediocre examination receive licenses to shave, cup and bleed in very small cities.

An Apothecary

must bring evidence of having received instruction and of seven years' service. In case of his death or disability, a sworn and approved dispensing-clerk must be taken

The Midwives

receive instruction in the provincial schools for midwives. Their examination takes place before the superior Collegium.

All persons engaged in medicine pay the approbation fees to the superior Collegium; medicus, chirurgus and apothecary receive the medical books, to wit, the medical ordinance at the rate of one thaler, the dispensatorium at two thaler, the medical tariff at 16 groschen, and the book of instruction for midwives at 8 groschen. From these payments the subordinate officials receive their salary, the balance being divided among the unsalaried members of the superior Collegium. — The chief receives no salary. The superior Collegium meets weekly on Friday at 11 o'clock. About 1500 cases come before it annually.

II. The Superior Collegium Medico-chirurgicum.

The beginning of this was the Theatrum anatomicum, founded in 1713, and provided with definite regulations in 1719. In winter anatomical lectures, and in summer lectures on surgery, are to be held. It was designed particularly for army-surgeons. It was instituted in 1724 with the following professors, professor of therapeutics, Dr. Henrici; professor of anatomy and physiology, Dr. Buddeus, professor of botany, Dr. Ludolf, professors of chemistry, Drs. Pott and Neumann; professor of mathesis (judicial astrology), Schütz; demonstrator of surgical operations, Senft. In 1786 the institution, in addition to the Director, had eight professors: two professors of anatomy, one of botany, one of physiology, therapeutics and pathology, one of chemistry, one of surgery. The professor of surgery teaches surgical operations, medical surgery and accouchement. The lectures are free, the salary of the professors being paid by the state. Matriculation costs two thaler. The professors are permitted to give private instruction also, and the honorarium for this is settled by agreement. In anatomical instruction 200 bodies are consumed annually. — In the examinations royal pensionary chirurgi and ex-superior- and staff-chirurgi are required to make six anatomical demonstrations, and to perform six surgical operations. A surgeon for a large city must make two anatomical demonstrations and perform six surgical operations. The Collegium is independent and has its own chief.

Sixteen young surgeons are instructed gratis, and of these the fifteen older receive an annual pension of 100 thaler. The oldest is in Potsdam in charge of the royal court; two others are in the Charité, and one in the "Invalidenhaus" to learn practice. On the decease of a regimental surgeon the most capable of the pensionary surgeons is appointed to the vacancy. "In order that there may be no lack of young and capable surgeons for nomination to the vacancies in the preparatory school, the regimental surgeons must take as company surgeons only those who have already acquired surgical knowledge, and who in the garrisons of this country are specially required to attend the public lectures of the medico-chirurgical colleges and the anatomical dissections. — Accordingly four young surgeons, who have already some knowledge of anatomy, physiology and pathology, are maintained free of expense in the Charité hospital, while two pay a trifling sum for board, in order for the term of one year to study practice in external and internal diseases under the oversight of the physicians and surgeons appointed to the hospital, and to be subsequently appointed company-surgeons."

Provincial colleges existed: 1. for East Prussia in Königsberg; 2. for West Prussia in Marienwerder; 3. for Neumark in Cüstrin; 4. for Pomerania in Stettin; 5. for Magdeburg in Magdeburg; 6. for Halberstadt in Halberstadt; 7. for the county of Hohenstein in Ellrich; 8. for Cleves in Cleves; 9. for Minden in Minden; 10. for the county Mark in Hamm; 11. for the principality Mörs in Mörs; 12. for East Friesland in Aurich. The members receive no salary except their fees.

Physici existed in most of the large cities. They received a salary from the city exchequer, and in the Circles from the treasury of the Circle. They were required to have made a specially good cursum anatomicum and to have discussed themata medico-legalia. Such officials were found e. g. 1. in the Churmark: a. in the Altmark 7; b. in the Priegnitz 4; c. in the Havelland Circle 6; d. in the Ruppin Circle 2; etc., etc. Their total number amounted to 131.

Instructors of midwives, provided with an annual, fixed salary, existed e. g. in Berlin one; in Prussia two; in Magdeburg one; in Halberstadt one; in Minden, Ravensburg, Tecklenburg and Lingen five; in Cleves one; in the county Mark one; in Mörs one; in the county Hohenstein one. Total 14.

In the numerous free cities which then existed (in contrast with the present day) the "Stadt-Physici"[1] continued to be official physicians. Of these there were in the larger cities several, who together formed the "Physicat", a body in which each individual had an equal voice though one of its members bore the title of "Physicus primarius". The "Stadtphysici" ranked above the "Landphysici". The "Landdoctor" (country doctor) too still existed everywhere, and was held in less esteem than the Stadtdoctor (city physician) even by the state, just as he is at the present day by the "educated". Yet the inferior medical faculty was considered quite good enough for the poor, dependent peasants, though Würtz said: 'Medicine consists not alone in regard for the person, whether he may be a physician of lords or peasants, whether he may be well-known and a resident of the city, or a dweller in some hamlet; for the whole matter depends upon whether a man understands his business and is able, and knows how, to aid nature, or not." — The Landphysici subsequently stepped into the places of the Stadtphysici, as indeed they do at the present day.

For the practising physicians, who, with few exceptions, would on no account perform surgical or obstetrical operations, and who, at least in the country, were still comparatively few in number, the right, after passing an examination in some one of the German universities, to settle in any other territory of the empire without a new examination no longer obtained everywhere, as had been the case in the 17th century. In Prussia at least, the model among German countries of bureaucratic tutelage of its subjects. every doctor medicinæ, as appears from the medical edict quoted above, besides his examination before the faculty of his university, was compelled to undergo an examination before the Collegium in Berlin before he could practice in the state of Prussia, and this ordinance applied even to Prussian subjects. However, physicians preserved at least the right of free settlement even in Prussia. In the other German lands, however, the earlier right of migration maintained its existence for a longer period than in the model bureaucratic state of that time, and if a medical man had received the title of Doctor from any Faculty whatever, or even at the hands of a Pfalzgraf (doctor bullatus), he could practice in most states of the empire. The "diplomirten Wundaerzte" (graduated surgeons) of the Josephinum were employed as general physicians, but were denied the right of free migration. Doctors and magistri of surgery and midwifery who had studied with any of the faculties, were, on the other hand, free to migrate, and employed as surgeons to the Circles, chief physicians in hospitals and, indeed, as professors. They were the operative surgeons (F. Strohmeyer). The Doctores medicinæ were practising physicians, physicians of the Circles and professors and were free to migrate. — In the country only a few physicians (medici puri), besides the Physici appointed to these neighborhoods, ever settled. The practice here belonged in the main to the surgeons, barbers etc. Maria Theresa endeavored to protect these country-doctors from want by having a special district assigned to each one of them. In rare cases only was a higher medicus called into the country, quite a contrast to the present day, when in all parts of Germany (far more than in France, England etc.) higher physicians are distributed over the surface of the land in such numbers that in 1873 there was one physician to every 2616 inhabitants.[1]

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[1] Frankfort-on-the-Main has restored the office of Stadtarzt, and appointed to this office the hygienist Dr. Alex. Spiess.

In France, on the creation of the Écoles de santé in 1794, practice was made entirely free. The same is the case at present in the new German Empire. Any one could practise if he had only paid for a license as a physician, a regulation not yet introduced into the new German Empire. Great evils arose from this arrangement, and individual prefects therefore entrusted medical "Jurys" with a sort of examination, while the School of Montpellier in 1797 proposed mere provisory licenses. In 1799 an effort was made to go back to the old Faculties and surgical institutions of instruction, but it proved a failure. The Faculties were not restored until the establishment of the Empire, which likewise retained Écoles de médecine.

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1. On the other hand Wurtemberg, considered by itself, had one physician for each 3971 inhabitants, and each of these practitioners had, on the average, an income of 493 marks ($123). In Ellwangen the physician received, indeed, only 30 marks, 60 pfennige. The poorest paid widwives were in Tubingen (2 marks, 40 pfennige per year) and Öhringen (1 mark, 70 pfennige per year). — In 1876 a physician had only 3120 persons to treat (average of the whole empire). In Berlin each of the 1001 physicians had but 1156 persons under his care.

A numerous class of physicians which arose in the 18th century were the bath-physicians. In Germany these were the result of the increased popularity of bathing-resorts, occasioned especially by the influence of Friedrich Hoffmann. In France, on the other hand, which as early as the 17th century had inspectors of baths appointed by the state, these officials appear as a class of physicians called into existence by the government. Thus e. g. Sénac was appointed by the state the chief officer for the bathing resorts. The baths provided at the bathing resorts for the poor and for soldiers especially were placed in his charge, institutions which, as we know, existed also among the Romans. In Germany, too, special "Quellenärzte" were to be found — in Gastein the first permanent bath-physician appeared as early as 1671 — who in certain bathing resorts enjoyed a salary from the state. Thus Joh. Dan. Gohl (died 1733) was "Brunnenarzt" in Freyenwalde, and Chr. Fr. Stromeyer, when appointed to such a position, received in 1796 a salary of 750 marks. This arrangement, however, was rare, and, on the whole, applied to only a few of the smaller bathing resorts. At the larger ones was located the residence of the "Physici", where such a course was convenient. Besides these, however, ordinary practitioners also settled in these resorts — e. g. at Karlsbad — as bath physicians. Patients as a rule before visiting the baths obtained the required directions as to their use from their own physicians and managed accordingly; or they entrusted themselves to the bath-masters, as was the usual custom in earlier times In order to be able to give the proper directions at home, and to become acquainted with the arrangements of the bathing resorts and the effects of the waters, many German physicians — and many English physicians at the present day — before entering upon practice undertook travels to various baths, as e. g. Heim. This was at all events better than the system of the present day, in which we merely consult the prospectuses (published too often merely as advertisements) and the analysis of the required waters, without troubling ourselves generally to inquire whether the bathing arrangements, the attendance and the individual physicians who present their own recommendations, are really good. An eye was also kept at that time on the question whether the entire business was not designed to basely impoverish sick, frequently poor and doubly unfortunate men, lest the visit to the baths might occasion for these, instead of the cure of their diseases, only new cares and subsequent deprivation, added to the other unavoidable necessities of the suffering, particularly if the visitation of the baths remained absolutely fruitless, as was so frequently the case. The number of the bath physicians was trifling in comparison with the present day, and we therefore read nothing of the frightful rivalry which blooms forth here and there in our resorts for bathing, and of which the patients when they return home are not infrequently able to tell wonderful stories; nor do we hear of the private letters of recommendation which buzz about our ears everywhere now, and often degrade intolerably the standing of the profession.

Another innovation which the last century introduced into practice were the so-called "Hausärzte" (family physicians) in the best sense of the term, an arrangement which, as already mentioned, impressed upon the profession of the physician a peculiarly beneficial stamp.

The physicians of the 18th century, in contrast to those of bygone ages, did not look upon their professional business as merely a sort of productive milch-cow, to be drained for their profit, nor, as in the preceding century did they devote their attention to quixotic matters, like alchemy, astrology, uroscopy and the like. At least this was true of the better class, who, as we have already remarked, must determine our opinion regarding the entire profession, for in all centuries the mass is pretty nearly the same. Alchemists and producers of the philosophers' stone died out in this century, and one of the last of these was the Englishman John Price. Physicians too, though often possessed of the required knowledge, were not so frequently chemists, physicists or mathematicians *ex professo*, i. e. teachers of these branches, as was the case particularly in the 17th century, but they practised for the most part medicine only. Then too they no longer contracted to fill positions for a limited period, and still less did they travel about from place to place, but rather as a rule remained in the place once chosen for a residence and changed their homes very rarely. Thus the profession acquired a character of steadiness and solidity, and found opportunity to establish and preserve the esteem and affection of its clientèle, which was not the rule with the mass of physicians during the 17th century. Of course with the improved social position of physicians many mediæval blemishes disappeared. Even in the universities, although there were still many disorders, the mediæval custom of swilling beer was abandoned somewhat among the better students. Hence greater efforts after improvement and education appeared more frequently at least than heretofore, and particularly a devotion to belles-lettres and philosophy. Certain universities, especially Göttingen, became seats, nurseries and centers of good taste and æsthetic associations, in which not a few future physicians took part. (In our sober century, so devoted to the cultivation of special branches, such an interest in æsthetics would very likely be regarded by most teachers, as well as by the public, not only as no recommendation for a student of medicine and a future physician, but as an actual ground for unfavorable criticism.) Accordingly in the 18th century not a few members of the German medical profession — and thereby they became no worse physicians, but rather the reverse — took a great share mediately and immediately in the perfection of our polite literature. Among these we may mention Withoff, Günther, Werlhof, Haller, Hensler, Zimmermann, the Thuringian Neubert, Althoff, the trusty friend of the great but unfortunate lyric poet Bürger, Schiller, the famous English poet Mark Akenside[1] (1721–1770) and numerous others. Lessing was, at least for a time, a student of medicine. Some physicians, however, were encyclopædists, like Pierer, who is best known by his "Conversationslexicon", and Joh. G. Krünitz (1728-1796), the author of a most comprehensive encyclopædia in 70 volumes; others were important philosophers like Cabanis, Schelling etc.; others, mathematicians like Olbers etc.

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[1] To whom we might add Oliver Goldsmith, George Crabbe, John Armstrong, Sir Richard Blackmore, Sir Samuel Garth, John Wolcot (Peter Pindar) etc. (H.)

Of course the relations between colleagues were not exempt from the hereditary infirmity of the profession — *πτωχὸς πτωχῷ φθονέει, καὶ ἰατρὸς ἰατρῷ* is a very old saying — and to its preservation the division of the latter contributed no little share. Certain Berlin physicians distinguished themselves in this sphere, so that a Gundelsheimer may be regarded as the type of a bad colleague. Professional relations in general, however, and in comparison with earlier and later times, were so good, that they may be looked upon as models in their way. Professional pride was very active, and the great number of superior physicians, most of whom enjoyed an excellent general education, threw into the back-ground the small number of unworthy representatives of the profession, who of course lacked such education. Existence, inasmuch as the profession was not yet overcrowded, was not so difficult as at the present day, and thus the faults and infirmities of physicians did not appear in so glaring a light. Many physicians enjoyed so large a practice that they were compelled to have

Assistants, as was, indeed, the case with many of the old Greek physicians. Even men of considerable eminence began their career as assistants. Thus Heim in 1776 occupied such a position in Spandau, receiving his board and lodging free, in return for which he was expected to treat the patients and corporations with whom his employer had contracts free of expense, though he was allowed to accept voluntary fees and presents. This practitioner, afterwards so famous, served, like the French generals, from the ranks up, and yet became the ordinary physician of a princess, and, indeed, when she treated him improperly, was able to discard her as she deserved. In the year 1782 — we mention it as an example of the career of an eminent physician of the last century — he had in Berlin 784 patients, and from this practice derived an income of 4200 marks ($1050); two years later, however, with only 393 patients his income increased to 6600 marks, and six years later still, with 1000 patients, he received 24000 marks ($6000) in money and 2400 marks in presents. In 1795 for a considerable period he made 83 visits per diem. In 1805 Heim's income went up to 36000 marks ($9000), in spite of the fact that, in contrast with many celebrities of our day, he had treated 4000 poor persons gratis. During the years of the war, indeed, he suffered some loss; but subsequently his income again rose to its former height, and even extreme old age failed to teach him the ingratitude of which the medical profession has often to complain — that of falling an undeserved victim to younger rivals — and which this modern novelty-seeking and irreverent age brings so often before our eyes. How modestly Heim began may be inferred from the fact

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that he was able to give for his first "Faible" or writing-desk only 180 pfennige, while his last one cost 750 marks.

Taking into account our experience of the present day, we may estimate the income of a mediocre practitioner of the 18th century, in a city of some size, at an average of 3000–4000 marks, which sum expressed in money of the present day would need to be multiplied as much as three times.

The English physicians, in consequence of the medical arrangements prevailing in that country, were generally better situated than the Germans, and accordingly the famous practitioners far surpassed the German physicians in their acquisition of money. Thus Fothergill was able to bequeath in his will £200,000 to the poor. [Fothergill's highest income in any single year was £5000, while Dr. John Coakley Lettsom in some years took in not less than £12,000, and the largest income of the famous Mead in any single year was £7000. Sir Astley Cooper in the early part of the present century had for many years an income from his practice of more than £15,000, and the highest sum received by him in any single year was £21,000. It may however console the struggling young practitioner of the present day to read that the first year of Sir Astley's practice netted him five guineas, and it was five years before his income amounted to £100. In the ninth year of his practice he took in £1100. Of course all these incomes were exceptional, but they serve for comparison with that of Heim as quoted by the author.] Russia too, then as at the present day, promised large incomes to physicians. Thus Orräus in Moscow acquired in a short time about 90,000 marks ($22,500). While these instances are only exceptional, they give us a basis for judging of the external situation of popular physicians at least.

If physicians were, on the whole, very much respected, well situated socially and generally well informed, medical practice proper, again lagging far behind the age, was in many respects very bad. Many practitioners were devoted to the therapeutics of a certain school, or imitators of the prevailing tendency of the period. Indeed they were not all exempt from charlatanism, an hereditary infirmity founded in the imperfections, uncertainty and vacillation of professional treatment and the weakness of character of the individual. Of this infirmity the better physicians made loud complaints. Thus e. g. Heim, with his frankness and love of the truth, in the beginning of his career expressed himself in terms of bitter reproach on this subject, until his wife with much worldly wisdom dissuaded him from such a course as productive only of disagreeable relations and malicious calumny.

Physicians, as a rule, had still the most profound faith in drugs. The public too followed their example so closely, that an ordinary, i. e. exceedingly large, medicine-spoon was in many places a regular portion of the dowry of a bride, (like a cradle etc.). Accordingly prescriptions a yard long still flourished in daily practice even far into the present century.

mixta-composita of ten or more ingredients, as the author himself has seen. All abracadabras of course required to be written in a foreign tongue, but the great emperor Joseph thought that prescriptions might as well be written in good German as in Latin. Uroscopy, in accordance with the "Urinbüchlein", e. g. those of Th. Majus, Brian (Hamburg, 1738) and others, was still practised. The prescriptions still contained all the trash of bygone centuries, such as precious stones, the dung of various sorts of tame and wild animals, mummy, so-called liquid and potable gold and silver, bezoary, so-called elephant-lice, wood-lice (recommended by the famous surgeon Schmucker as a snuff in amaurosis) and a host of other similar things. Theriaca was still under official supervision, and its preparation was regarded as so important that the occasion was made a sort of gala-day in Würzburg as late as 1736, in Nüremberg in 1754 and in Paris as late as 1787. Fussiness and over-medication also prevailed — e. g. in cases of poisoning, theriaca internally with milk, an emollient clyster and a cordial plaster — while even the better class of physicians sold proprietary remedies and indulged in mysticism. Not a few physicians, like e. g. Hoffmann, Stahl, Theden and Schmucker, had their own arcana and specifica,[1] in which they did a thriving business, and Heim's patron, the famous privy-counsellor and physician-in-ordinary Fr. Herm. Ludw. Muzell (1716–1784) of Berlin, who though a medicus purus still practised surgery (he was the first to perform ligation of the ischiatic artery), even as late as the last half of the century advised his son "to confide his methodus medendi to no one, not even to his most intimate friend." Under what regulations the physicians were permitted to sell such proprietary compounds throughout the whole century is shown by the medical edict quoted above.

Here and there even the authorities themselves practiced medicine. Their prescriptions took the shape of stringent edicts. Thus e. g. the pompous Karl Theodore (1724–1799) in the year 1784 charged his subjects that in cases of hydrophobia no one should take any medicine, but simply make intercession to St. Hubert, a piece of advice which (barring the superstition involved in it), considering the uselessness of all therapeutics in such cases, might not seem entirely inappropriate, particularly if the decree had emanated from some medical college or another, and the intercession to St. Hubert had been left out. Some noble and gentle families had, and dealt in, certain inherited family arcana. Indeed as late as 1877 the ruling family of Mecklenburg supplied such a secret preparation on petition therefor, and it was not until 1878 that they placed it in the hands of an apothecary for sale. In England in 1714 the day and hours in which the king would cure the "King's evil" (scrofula) by the imposition of his hands were announced in posters. — Authoritative decrees, like that mentioned above, against medication in disease, might have produced still greater benefits in opposition to the blooming school-therapeutics of that day. Yet we read that one physician who practised in accordance with the system of Brown, of 600 fever patients lost in three weeks 200, and most of them too died through, and in a state of, drunkenness! Marcus too in 1798, practising the Brunonian system, administered to each of 480 such patients whom he treated in that year, on the average one drachm of opium, 195 grains of camphor, one ounce of Hoffmann's Anodyne, 132 grains of serpentaria, 528 grains of cinchona (to-day we give as many grains of quinine, even in pneumonia, a disease which, as we know, gets well of itself!), more than a pound of rectified spirit, with considerable doses of musk, sulphuric æther etc. etc. Another physician, opposing this method of Marcus, as dangerous as it was expensive, estimated that the complete cure of intermittent fever, a disease of which fortunately men rarely die before the disease disappears of itself, cost only — six cents' worth of opium and 24 cents' worth of brandy. Readily, indeed, might Wedekind be led to say "The value of medicine, expressed in two words, consists chiefly in this, that civilized nations have to suffer far more from their physicians than from their diseases." This was especially true at that period — and indeed far down into the present century — of Spain; for the Spanish physicians were distinguished, before all others, for their ignorance. Bleeding and cathartics were their chief remedies. To be sick and to call in a physician was in Spain about the same thing as to die. Think of it! When the authorities once asked the physicians whether it would be beneficial to the residents of Madrid to have the streets cleaned, these Æsculapii decided that, on the contrary, it would be injurious, that no variation should be made from the customs of their forefathers, and that the filth and foul smells should be left in the streets; that the sharp and stinking air was even exceptionally good, as it destroyed the material of infection! (Newton's discovery was also regarded as dangerous, since it did not support the faith). — Foreign physicians, particularly those from the faculty of Montpellier, were accordingly much sought after in Spain. The domestic physicians, as a rule, when they had bled a patient on one arm on one day, bled him on the other arm on the following day, so that the blood might be again equally distributed throughout the body. (In Spain, as elsewhere, venesection was looked upon as a preventive measure, though here the "equilibrium" was established in the way described without any knowledge of the circulation of the blood.) Some few physicians, however, studied the works of the heretic Cullen and Hoffmann. — That the sciences accessory to medicine were in a very depressed condition we have already stated. Even surgical instruments were very roughly manufactured, and medicines were badly prepared. In the larger cities the drugs were imported from abroad, and in the smaller cities and those remote from the capital they were so bad that one had reason for joy if they did no harm. In the middle of the 18th century there was no chemist in all Spain, and indeed the Spaniard Campomanes assures us that even in 1776 there was no one in the whole country who knew how to prepare the commonest drugs like Glauber's salt, magnesia, mercury and antimony. The statesman above named set to work to establish a chemical laboratory in Madrid, though he believed that it would be regarded as dangerous (Buckle). A foreigner, Cervi, founded the medical societies at Madrid and Seville (1732); Servili, the college of surgery in Cadiz (1741). "In order to make physiology and botany accessible to the students, application was made to Linnæus to send some one as a teacher." In the end, however, Spain had its 16 medical schools, with a curriculum arranged by the state. In Spain too the surgeons were subordinate to the physicians. The number of the latter was so great that in the capital there was one physician to every 1200 inhabitants. Of course not a few of them were incarnate beggars.[1] Permission to practice was easily obtained, without requiring much of an examination; it was also cheap, costing $45 until towards the close of the century (1795), when in Madrid it could only be obtained for $325.

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[1] In England Sir Hans Sloane sold a secret eye-salve, and the famous Mead had a secret nostrum for the bite of a mad dog. (H.)

The management of the insane was everywhere as bad as possible. There were no physicians for these poor creatures; at most mere attendants who conducted the maltreatment of their wards. The poorest were confined in dark rooms, chained or put into cages and exhibited at a penny a head.[2] Such was the condition which the elder Stromeyer found in England, in England whose physicians might have learned from their great poet Shakespeare (1564–1616), almost two hundred years before, the best and most humane principles for the treatment of the insane! At this time the harmless insane in London wore upon their left arm a ring, and about their neck a large ox-horn, and were permitted to go about the streets begging !

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[1] Even down to the forties of the present century it was the custom for Spanish students during their vacation to "terminiren", i. e. go begging like the mediæval "travelling scholars". Up to this time too no college fees were paid, and the students wore a peculiar black dress with a sword. In the colony of Manila Jesuits still taught medicine in the medical school of that place, and the leper-houses were under the oversight of clergy of the religious orders. The assignment of patients to these houses was made by the bath-keepers (medicillo), as in the Middle Ages. Most of the apothecaries (botanico) are Germans. (Körbel: "Wiener Wochenschrift", 1878).

[2] John Aubrey writing towards the close of the 17th century says: "Till the breaking out of the Civil Wars Tom o' Bedlams did travel about the country. They had been poor distracted men, but had been put into Bedlam, where, recovering some soberness, they were licentiated to go a-begging, i. e. they had on their left arm an armilla of tin about four inches long; they could not get it off. They wore about their necks a great horn of an ox in a string or baudry, which, when they came to an house for alms, they did wind, and they did put the drink given them into this horn, whereto they did put the stopple. Since the wars I do not remember to have seen any one of them." Perhaps Edgar in "King Lear" refers to the latter custom when he says "Poor Tom, thy horn is dry". During the last century the Bethlehem Hospital for the insane was a favorite resort of the belles and beaux of London for amusement. Sam. Johnson and Boswell wandered through the institution, and Steele took three schoolboys to see "the lions, the tombs, Bedlam and the other places which are entertainments to raw minds, because they strike forcibly on the fancy" (Jeaffreson). (H.)

The following account is given of the German institutions for the insane :

"In these dens, exposed to all the storms of the elements, there was a lack of fresh air, sunlight, exercise, amusement, in short of all the physical and moral means which are required for the cure of the sick. The attendants of the goalers are for the most part rough men, with whom barbarity is an everyday matter. . . . . The bellowing of the maniacs and the rattling of the chains resound day and night in the streets (of the dens), in which cage strikes against cage, and deprive each new comer speedily of what little reason may have been left him." Thus wrote Reil as late as 1803 !

The first insane asylum, according to our present system, in the civilized states of the north was that of St. Luke's in London, which was opened in 1751. This was followed in 1792 by one erected for the Quakers near York. The first institution in Germany was established at Sonnenstein in Saxony. Still such asylums continued too few to be at first anything more than models for the treatment of the insane. In most places the old style was still followed for a long time. Thus in the twenties of the present century the insane in Italy were chained, without clothing and without means for preserving cleanliness. In the provincial cities of France matters were managed in about the same way, even as late as among the thirties of the present century. The infamous "Narrenthurm" continued in use in Vienna still longer —until 1853! In Germany too the old rooms for the insane were only gradually done away with during the first half of the present century.

The management of the syphilitic was as bad as that of the insane. In ordinary practice the treatment of the former was conducted at home by surgeons or itinerant empiries. Indeed, even in Vienna until the time of van Swieten, the syphilitic were treated in the hospital of St. Marcus twice a year by such an empiric, who knew nothing whatever of medicine. They were dosed with the secret remedy of the hospital until salivation, haemoptysis not rarely, vomiting etc. set in, or mercurial poisoning for life, at all events, was induced. It was not until the death of this quack that in 1754, through the powerful influence of van Swieten, a genuine physician was appointed to the hospital for the syphilitic.

Most of the hospitals were still in a lamentable, indeed, a dreadful condition, rather nests of disease than institutions for the cure of the sick ; for hospital hygiene, with which even Theophrastus von Hohenheim was acquainted, was utterly lost sight of or neglected. In the Hôtel-Dieu at Paris (said to have been founded by bishop Landri, A. D. 651) single large halls contained more than 800 patients. The entire institution contained 1220 beds, of which 734 were large, i. e. occupied by four to six patients, and 486 small (3 feet wide, while the large beds were 5 feet in width) for single patients. The mortality amounted to 20 per cent. ! Almost all those who underwent operations, particularly amputations, died. — Max

Nordau with the shrewdness of a newspaper reporter describes the earlier condition of the greatest hospital in Paris: "In the lower halls, which lacked light and air, there were no beds. On the tiled floor lay heaps of straw, and upon these pallets the sick crowded each other, packed together like herrings in a cade. On one occasion when Louis the Saint visited the hospital, the straw upon which the miserable creatures were rolling was so frightfully filthy, stinking and rotten that the king in affright ordered fresh straw to be brought at once from the Louvre and spread out in the halls. About the middle of the last century beds were furnished, but the situation of the sick was in no way improved thereby. In one bed of moderate width lay 4, 5 or 6 sick persons beside each other, the feet of one to the head of another, children beside gray-headed old men, indeed, incredible but true, men and women intermingled together. In the same bed lay individuals affected with infectious diseases beside others only slightly unwell; on the same couch, body against body, a woman groaned in the pangs of labor, a nursing infant writhed in convulsions, a typhus patient burned in the delirium of fever, a consumptive coughed his hollow cough and a victim of some disease of the skin tore with furious nails his infernally itching integument. Medical service was deficient, the medical directions scarcely followed and the choice of remedies very limited. The patients often lacked the greatest necessaries. The most miserable food was doled out to them in insufficient quantity and at irregular intervals. The nuns were in the habit of feeding with confectionery those patients who seemed to them pious enough, or at least those who reeled off their rosaries with sufficient zeal, but the body exhausted by disease required not sweets, but cried out for meat and wine. Such food, however, the sick never received in profusion, save when it was brought to them by the wealthy citizens from the city. For this purpose the doors of the hospital stood open day and night. Any one could enter; any one bring whatever he wished; and while the sick on one day might be half-starved, on another day they might very likely get immoderately drunk and kill themselves by overloading their stomachs. The whole building fairly swarmed with the most horrible vermin, and the air, of a morning, was so pestiferous in the sick-wards, that nurses and inspectors did not venture to enter them without a sponge saturated with vinegar before their mouths. The bodies of the dead ordinarily lay 24 hours, and often longer, upon the deathbed before they were removed, and the other sick during this time were compelled to share the bed with the rigid corpse, which in this infernal atmosphere soon began to stink, the green carrion-flies swarmed about. . . . . Whoever has not had enough of these revolting details will find them still more highly colored in the monograph regarding the Hôtel-Dieu published in 1867 by Dr. Pietra-Santa." Under Louis XVI, each patient was first furnished with his own bed, the sexes were separated, children placed by themselves, attention given to better nourishment and the feeding of the sick by the donations of the charitable done away with.

"Accordingly in a few months the mortality sunk from 25 to 13 per cent. The mediæval condition of affairs, however, was perceptible down to our own times, and until towards the close of the seventies, when the old hospital was torn down and a new building erected on the same site. Even the latter does not correspond with German ideas of hygiene." Such was the condition of affairs almost everywhere, and it was not until the introduction of clinical instruction that the situation was somewhat improved. A new chapter in this department of the healing art was opened particularly by the pioneer Joseph II. in Vienna, though it was not until the middle of our own century that hospitals generally were thoroughly reformed. How horrible the sanitary conditions of the hospitals were at the close of the 18th and the beginning of the present century, may be judged from the fact that in some places, e. g. Frankfort-on-the-Main, even physicians declined hospital service as equivalent to sentence of death.

The physician of the last century, like the ancient periwig, was even in externals a very different kind of man, at least on festive occasions, from other men, and was then recognized as certainly by his dress as are many of our modern "precise followers" of Æsculapius, or charlatans d'exactitude, — a kind peculiar to our century — by the fashionable cut of their clothing, their universal greetings and rapid gait, their imperturbable amiability and the thermometer, stethoscope, percussion-hammer etc. etc. peeping out of their coat-pocket. As at that time a cap was placed upon the doctor's head in graduation, in recognition of the fact that physicians at an earlier period belonged to the clerical profession, so in later life, when called upon to represent a physician, he wore a flesh-colored or scarlet coat (scarlet was the color of the medical guild, black that of theologians, yellow that of lawyers), the procuring of which would have cost old Heim 150 marks before his entrance upon practice in Berlin, if he had not received a present of one. The coat even belonged to medical politics. [The regulation full-dress costume of the English physician of the last century consisted of a well-powdered wig, silk coat and breeches (short) with stockings, buckled shoes, lace ruffles, cap, and last, though by no means least, a gold-headed cane. In cold weather there was added to this costume a muff for preserving the delicay of touch in feeling the pulse of his patients. According to Jeaffreson, the last of the silk-coated physicians in England was Dr. Henry Revell Reynolds, one of the attendants upon George III., and in his day the Brummel of the Faculty. H.]

Werlhof, however, at his second marriage — some variations from the guild-costume were permitted even at this day — wore, instead of the ordinary scarlet coat one of violet-colored velvet. This wedding of Werlhof's, who by the way was wealthy from the beginning, furnishes us with some interesting information as to the domestic arrangements and customs of well-to-do physicians of the 18th century. He had a parlor decorated with elaborate tapestry (we find, however, no mention of a waiting-room with its table covered with literature, such as is seen with some famous doctors and professors at the present day), with high armchairs of walnut upholstered in Utrecht red velvet, a Venetian mirror and a chandelier of rock-crystal. Adjoining this room was a hall decorated in plaster, whose tables were adorned with brilliant damask and glittering silver. On the ground-floor were set out two tables, 25 covers for the house-servants and their friends, and 25 for the poor pensioners of the family. Each poor person received from the bridegroom two gulden, and Frau Sarah, the bride (a widow), gave each of the servants a "Lammesdukaten" provided with a ring.[1] The coachman's father had to be carried home he got so drunk. Haller was present, and his valet, an Italian, made vain efforts to kiss Sarah's waiting-maid. Rhinewine was sent by the elector of Cologne. Finally sweet Constantia wine was handed about in small cut Venetian glasses. Haller delivered an epithalamium. The choristers sung a hymn before the door etc. (Rohlfs). Compare these arrangements and this wedding with that of Felix Plater! And a great many of the weddings of physicians during the 18th century must have passed off like that of Plater.

The "Corps of medical savages" and the superstition which served their purposes, although the former were subjected to legal proceedings and the latter was opposed by the so-called "enlightenment" of that time (of which, however, we observe no traces among the masses even to-day), were in the 18th century very great and almost as motley and manifold in form as in the depth of the Middle Ages. In no department of human activity has licensed and unlicensed charlatanry been ever better rewarded than in medicine; and naturally, for "primitive medicine" everywhere was based almost entirely upon it. Besides apothecaries and their apprentices, who still dabbled in medicine to the very limits of propriety, there were among the so-called "Volksärzte": grocers, book-sellers, printers, confectioners, merchants and traders, mountebanks, tooth-doctors, midwives, medical students,[2] preachers, chemists and their assistants, distillers, rummagers of all kinds, Jews, shepherds, doctores bullati, old women, conjurors, executioners[3] and their following, sieve-makers, Thuringian peddlers of water and olitäten,[4] uroscopists, herniotomists (who also cut away the testicles), root peddlers, bath-keepers, dealers in nostrums etc. etc. And this rabble was conspicuous in the country far down into the present century; indeed, even to day it has not entirely died out, and our laws permitting freedom of occupation are fast filling its ranks again.[5] That among the common people it was directed to touch the hand of an executed felon for the cure of epilepsy, and that many other superstitious procedures were practised, can excite no wonder, for they are still in vogue in the present day, and they seem the less remarkable in the 18th century because a regular system of popular schools nowhere existed. But it is rather remarkable to observe complete pagan medical superstition in full bloom in the enlightened 18th century, even among the wearers of the highest clerical honors. Yet a regular pagan amulet was found in 1749 on the breast of the prince bishop Anselm Franz of Würzburg, count of Ingelheim, after his death. — The author of the "Artzney-Teuffel"[1] remarks on this subject as follows:

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[1] Probably something like our modern "bangles". (H.)

[2] In the year 1716 the studiosus medicinæ Ephraim Gerichius was fined 25 imperials for practising medicine, and again 50 imperials for a second offence, so that his practice must certainly have been profitable. A predecessor of this fellow, likewise named Ephraim, in the year 1685 forged a diploma and practised on the strength of it.

[3] An executioner was appointed Prussian "Hofarzt" (court-physician) as late as the beginning of the 18th century.

[4] See note page ——

[5] In the year 1877 the "Doctorbäuerinn" Hohennester in the Bavarian highlands had more than 1000 patients from the higher and highest classes. The peasants must not be blamed too much if they do not escape from medical superstition. Free trade helps the quacks so much that in Bavaria in 1874 there were altogether 1156 (911 men and 245 women); in 1875 there were 1262; in 1876, 1396. We see the matter improves each year! In 1880 there were in Bavaria and Saxony more quacks than physicians!

"Very easily can the overgrown Empirici plaster over the eye of the common man, who holds entirely to the opinion that it makes no difference whether the Medicus be learned or unlearned, providing only he has many experimenta and some wagon-loads of written prescriptions and tricks, as if the whole art of medicine consisted in this. Thus he can readily give him advice. Therefore they have no scruples in going for counsel in their bodily necessities to all sorts of evil and mischievous fellows, such as Jews, gipsies, tooth-pullers, hangman's apprentices, old women, witches,[2] soothsayers, magicians, cut-purses, vagabond Salt in banco and mountebanks and such contemptible riff-raff." . . . . That such fellows are endured is due to the fact "that the authorities are blinded by Satan, and the apothecaries are permitted to sell poison to cursed Jews, alchemists, bath-servants and ignorant quacks, while dabsters, calf-doctors and rag-pickers, magicians, witches, crystallomancers, soothsayers, conjurors and other mancipia of the devil are allowed to practise medicine." . . . Examples of cures: "One devil's-head gave to all the sick who consulted him a little rasped or pulverized rogue's-bone, so that in one year almost all the bones of thieves and murderers which he could collect from the (numerous) gallows and wheels, were swallowed down. With such unicorn- and heart-powders the devil-doctor", whom the author accuses rather of being a suborner of such cases than a blockhead, "knows how to comfort his patients, although in Jure Canonico and sub pœna excommunicationis and exauctorationis it is very strictly forbidden to Christians to seek counsel and aid from Jews in their sickness." Even a blind Jew was an uroscopist; another sent from a distance a purgative, which "not only brought away from the woman concerned the fruit of her body, to wit 2 twins, but also put an end to her own life." (!!) Then "the Alcumistic Society, after losing all its possessions and goods in searching after the philosophers' stone, and blowing them up the chimney" also dabbles in medicine. "When such an Alt-Kuhmistic medicaster had given to a sick peasant, who was prostrated by fever, some of his murderous mercurius vitæ, the patient at once became sick even unto death, and the next day proceeded ad patres". Similar things were done also by "certain, covetous, inexperienced, careless, bibulous, perjured, fool-hardy and deceitful apothecaries", as well as by the "Uromantes or uroscopists." But, and this is the worst of all, "we find even excellent Practicos, who permit the sick to bring their urine to the house, and from its appearance diagnosticate the disease.[3] It is true

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1. "Artzney Teuffel oder kurzer Discurs darinn diesem Ertz-Mörder seine Larve abgezogen, und wie tückisch, boshatt und arglistig" etc., by Ananias Horer, 1721. (H.)
2. In 1749 a nun of 70 years was burned as a witch; in 1756 a magician was condemned to death; in 1752 a maiden of 13 years, and in 1754 one of 14 years, was executed as a witch, and in 1750 and 1782 (in Glarus) the last witches were burned!
3. Zimmermann said that, from Russia to Switzerland, he was regarded as a great practitioner, who had, instead of books, a large number of urine glasses, in which the doctor ordinarily urinated himself.

we find more of these physicians than is good, and many a commencing practicus, against his will and with the highest chagrin, is forced to allow such quackery, lest otherwise he lose his patients and acquire a bad reputation with the common people. For many miserly people avoid calling in a physician in order to save a florin or so. For a batzen (coin) they call in a urinist and piss-prophet." "Of all external diseases, however, we can see nothing in the urine, nor can we tell whether the patient has taken shortly before some rhabarbara (the favorite remedy of Frederick the Great), "senna-leaves, saffron or the like, whether he exercises vigorously or has drunk much, by all of which the urine is very frequently altered." In veterinary practice much dependence was placed on exorcisms and witches. "What then is the good of such piss-quackery and open deceit, which ought justly to shame the very lungs (vitals) of an honorable man and a graduated person."[1] "When now, through the transmission of other liquorum, perchance the urine of a horse, cow, ass or other beast, or indeed of his own urine (there is an example of such a case), a ridiculous judicium has been wormed out of these Euclionibus, whereby they prostitute themselves individually and collectively and fall into undying disgrace and contempt, who can have any sympathy with them?" — Such an uroscopist advised a clergyman who had the dropsy to be bled (the same thing is done by regular graduates to-day!), and the patient died under the operation. — Moreover medical practice was undertaken by "over-curious, impertinent women, old weather-prophetesses, midwives, procuresses, female nurses or other trumpery, who have spent in revelry or evaporated with the aid of their husbands their own means." "They hackle the medicum (tout comme chez nous!), give behind the doctor's back a powder of pearls, emerald, unicorn, bezoar[2] and gold" etc. A hag of this sort gave "a few years ago to a pious, noble woman who lay in the severe pangs of labor, a spoonful of aqua fortis, with the comforting assurance that as this water had the power to separate from each other gold and silver, so by its influence the child would speedily be separated from its mother. But they found after the severest anguish and suffering that this water could separate, not the child from the mother, but the soul from the body, for in a few hours mother and child expired." — That in Italy charlatanism was even worse than in Germany may be inferred from a passage in Goethe's "Italienische Reise": "At Malo (in Naples) I saw a punchinello, who was quarreling with a little monkey on a platform of boards, above which was a balcony where a very pretty maiden sold her favors. Beside the monkey's platform a quack sold to the faithful his arcana against all evils". — [Even in sober-minded England charlatanism of all grades and varieties reaped a rich harvest. We need only mention the names of Joanna Stevens, whose specifics for stone were purchased by the government for £5000, after having received a certificate as to their efficacy, which bears not only the names of many noble lords, but even those of Cheselden, Hawkins and Sharp; Mrs. Mapp, or "Crazy Sally of Epsom", whose reputation as a bone-setter was rather enhanced than impaired by habits of drunkenness; James Graham, whose "Templum Æsculapio Sacrum" in London, with its "celestial bed" guaranteeing to the occupants thereof the blessing of abundant and beautiful progeny at the moderate rate of £100 per night, was a fitting monument of its founder, half fool, half knave; Mr. and Mrs. Loutherbourg, whose marvelous cures by the imposition of their hands excited the

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1. A short time ago a circle-physician was buried in the country who had acquired great reputation by the practice of uroscopy, while a regularly graduated physician in the city has obtained a fortune by the same means. And we write no in 1709, but 1875!

2. A stone of musk-like odor from the stomach of a kind of goat in the Caucasus. Miraculous powers were ascribed to it.

admiration of the metropolis about 1789; Dr. Myersbach, the purchaser of a medical degree at Erfurt on what in more recent times is known as the "Philadelphia system", and whom Lettsom strove to drive into his merited obscurity; and finally that prince of charlatans, St. John Long, the beau ideal of a handsome, witty and acute Irish impostor, for whose love a host of noble and gentle ladies languished in vain. The latter, however, belongs to the present century. The victims of these high-toned charlatans of the English metropolis were of course chiefly of the better classes. But what must have been the condition of affairs among the more ignorant and illiterate population of the provincial cities and in country districts? H.]

During the whole 18th century the surgeons were still strictly separated from the physicians, even in education. Nor were they esteemed as equal in rank with the latter, particularly in Germany, where the guild organization was likewise preserved. It was the French Revolution and its influence upon other nations which finally brought about the equality of surgeons and physicians, and the guild-surgeons, like the guilds themselves, received their coup de grace. This change was inaugurated by the abolition of the 18 Universities or Faculties and the 15 Colléges de Médicine of France in 1792, together with that of the Société Royale de Médicine (founded 1776) and the Académie de Chirurgie (founded in 1731).[1] Their place was taken by the Sociétés libres de Médicine. The two distinct branches of medicine and surgery were now united into one department of general medicine.

The 18th century not only introduced a class of surgeons possessed, on the whole, of a scientific education and devoted to general surgery, but also specialists in individual branches, particularly scientific oculists. Yet even some of these (as here and there at the present day) by travelling about acquired a mediæval and anomalous sort of practice, which compelled them to compete with the kindred "travelling eye-destroyers", still widely diffused throughout the country.

Surgical instruction, at least in the larger states, was given in special institutions or in the universities, and in Germany the German language was employed in the instruction of surgeons, though not in that of physicians. The required knowledge was no longer obtained exclusively from members of the guild. Yet for the lower class of surgeons the old method was still followed in many places. In Strassburg the Chirurgi and Tonsores at the university were so-called "Students of the minor roll", and their number frequently equalled or even exceeded that of the medical students proper. Their examination was not made before the faculty, but before a colleague of the guilds, associated with the professor of anatomy. Before examination they were required to exhibit an indenture and evidence of five years' service in the city, though in different universities the requirements were different.

The conditions of instruction in the branches of surgery and midwifery

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[1] By this abolition charlatanism acquired such a control over medical education that the arrangement was soon abandoned. In Germany the decree of 1868 authorizing freedom for medical botchery, has not yet brought us quite to this point.

(which were always looked upon as belonging together) had first improved in France, or rather they had developed here further and higher, in immediate connection with the preparations and acquisitions of the 17th century. This was occasioned especially by the fact that, at the instance of la Peyronie and partly too at his expense, chairs of instruction in surgery had been erected in Paris and Montpellier (1724). The "Charité" (founded 1727) was from its foundation an institution for the instruction of military physicians. The foundation of the Société de Chirurgie in 1731, however, was of the greatest influence upon the elevation of surgery in France. This institution, on the abolition of the Collége de St. Côme in 1753, was raised into the Académie de Chirurgie, which latter, on the foundation in 1795 of the Académie Française, was merged into the medical department of this institution. The so-called "École pratique", established in 1750, in which a Desault and a Chopart (1743–1795) subsequently taught, was designed for the practical education of surgeons. Desault particularly marks an epoch in the history of surgical instruction, since in 1785, as president of the Hôtel-Dieu, he opened the first surgical clinic in France, and taught and operated here three hours every morning. By his lectures on surgical anatomy he thus gave to surgical instruction that deeper and more secure foundation, which up to this period it had generally lacked. [In England the barbers and surgeons continued to form a single corporation until 1745, and the Royal College of Surgeons was not incorporated until 1800. Surgical instruction was imparted by members of the company of surgeons, by the hospital surgeons and by such professors of anatomy as existed in the universities. James Rae, lecturer on surgery to the College of Surgeons in Edinburgh, gave "practical discourses on cases of importance in the Royal Infirmary" for some years prior to 1772, and may thus be called the first teacher of clinical surgery in Edinburgh. The Monros also lectured on surgery as well as anatomy, but it was not until 1803 that a distinct chair of clinical surgery was established in the University of Edinburgh, in direct opposition to the remonstrances of Alex. Monro (Secundus). In 1806 a Royal Professor of Military Surgery was also appointed after similar opposition, but a chair of systematic surgery was not created until as late as 1831. The first incumbent of the latter chair was John William Turner, who was succeeded on his death in 1835 by Sir Chas. Bell. The University of Glasgow received a professor of surgery in 1815, and the University of Dublin not until 1849. Generally the subjects of anatomy and surgery were taught during the 18th century by the same professor. (H.)]

Practical (private) instruction in midwifery was first imparted to men by the elder Grégoire from the year 1720 onward. The midwives, however, still had their own public institution for instruction in the Hôtel-Dieu, as they had in the preceding century. The participation of men in this instruction was strictly prohibited, even when in 1797 the school for midwives was removed to the Maternité, where theoretical instruction, which had always been given by men, was imparted by Baudelocque. Public theoretical lectures at least on midwifery were already given to surgeons at the instance of la Peyronie in 1743; practical midwifery they learned in small private institutions, or in their own practical duties. In Vienna obstetrical instruction was first given in 1748.

In Germany the first impulse to the improvement of surgical instruction was given by Heister. This was greatly increased by Prussia when the preceding Theatrum anatomicum was converted into a Collegium medico-chirurgicum in Berlin, that is into an institution for the education of military physicians and medico-chirurgeons for the low country, a change effected in 1724 by Dr. Holtzendorf, Surgeon-General of Frederick William I. Frederick II. then enlarged the institution. It was remodeled into the "Pepinière" in 1795. and re-christened the "Friedrich-Wilhelms-Institut" in 1817, and has continued united with the "Medicinisch-chirurgischen Academie" since 1811.

A "Collegium-medico chirurgicum" for Saxony, similar to the Prussian, was opened in Dresden in 1748 by Augustus II., and three years later the first surgical clinic was added to it. All barbers' and bath-keepers' apprentices were permitted to participate in the instruction and the practical exercises, on the payment of an honorarium of 36 marks and some slight fees. Such pupils as had passed the examination in this school were required to be admitted into the guilds of barbers and bathers with the rank of "Masters" without any further ceremony, and enjoyed the privilege of being preferred before others in the assignment of places of business. The institution was enlarged in 1777, a teacher of dentistry was added, and the salaries of all the teachers increased. The same king in 1753 granted a Collegium medico-chirurgicum for the Poles, and in 1768 a medical Academy was likewise authorized, but not erected. The clinic was supplied with a hospital accomodating 1200 patients, and received an annual endowment of 1200 marks. A school for midwives was erected in 1781, together with an *institution for the education of male obstetricians.*

The improvement of surgical instruction extended far beyond the boundaries of Austria when Joseph II. in 1785, through Brambilla, opened the "Medicinisch-chirurgische Akademie" or "Josephinum", and also erected permanent military hospitals in Prague, Brünn, Milan, Mantua, Pesth, Olmütz etc. Before this the guilds, as well as the business of shaving (still united with that of surgery), had been done away with, since the latter occupation was not consistent with the title of Doctor or Magister of surgery and medicine, now bestowed upon the so-called Medico-chirurgeons.

The medico-chirurgical "Josephs-Akademie" was next created, in order to do away with the defects regarding surgical matters in the army. Here two classes of army-surgeons were educated: the first class became only surgeons, and were required, after the completion of their instruction, to serve 10 years in the army; the second class attained the degree of

Doctor, but were required to bind themselves to 15 years' service. Instruction in medicine was imparted, in a limited degree, to the latter alone.[1] The pupils of the Josephinum were chiefly ordinary barbers, or the sons of poor officials (these came with special frequency from southern Germany), who were able to educate themselves in Vienna because instruction here was free of expense. Many of these pupils subsequently attained great skill, and obtained important positions in the military service of other German states, since in the latter there was still a scarcity of good surgeons even down into the 19th century. As an example of one of these surgeons, and a memorial of one who died without fame, though a practitioner of the best kind,[2] embalmed in the hearts of his patients, we mention here Ludwig Rauch (1764-1836) of Arheilgen near Darmstadt, educated in the Josephinum and at one time military "Chef" of the Grand Duke of Hesse and "Stabsmedicus".

Since the life and education of Rauch may be regarded as typical of the career of surgeons in the last century, and have therefore a certain value in the history of culture, we introduce the following details.

Rauch, the son of an official who lost his property through mining speculations, entered upon his surgical apprenticeship in Butzbach. After completing his term of apprenticeship, he passed his guild-examination in Giessen and received the following certificate:

"We, the senior sworn and examined Chirurgi in the city and fortress of Giessen, testify that the honorable Ludwig Rauch, legitimate son of the sometime princely March-Commissioner Rauch of Echzel, at the date underneath written did appear before us and gave us due notice that he had been for three years a pupil of the most honorable and experienced Conrad Daub, chirurgus juratus and citizen of Butzbach, and with his colleagues of that place, at the end of which period, however, he has resolved, in God's name, to enter upon the years of travel fixed by the guild of that place for better qualification in the aforesaid surgery. Accordingly he prays us to this end to furnish him a certificate of the completion of his instruction and of his behavior sub sigillo of this princely Collegium chirurgicum of Hesse, and to enter his discharge in the official records of the guild. As now we, in complicance with the truth, are both disposed and obliged to say, of our own knowledge, that the aforesaid Ludwig Rauch has gone through his three years term of study in three successive years down to the annum currentem et datum, and in the same has not only devoted himself to the learning of laudable surgery, but has also during this time been trusty, obedient, modest, diligent, discreet, honorable and generally praiseworthy in his behavior, as becomes an upright Studiosus chirurgiæ, so we must declare that his patron has not only been pleased with him in all respects, gives him this public testimony and would gladly have retained him for a longer period were it not to his disadvantage, but we must also state that we can say of him nothing but that his mode of life up to this time has been such as to give evidence of good training and an exceptionally praiseworthy zeal. Accordingly we have not been able to

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1. According to Fr. Strohmeyer, the pupils of the Josephinum and other medico-chirurgical institutions were so-called "diplomirte Wundaerzte", and as such were general physicians, though not granted liberty to change residence at pleasure. (Medico-chir. Centralblatt, 1884, 33.)
2. He died in Worms. Napoleon I. invested him with the cross of the Legion of Honor with his own hands upon the battle-field, because he treated friend and foe alike.

refuse this his just petition, but have assented to the same, and by virtue of this open letter before the guild in corpore assembled, and wishing the candidate God's blessing, we have declared him free and discharged from his instruction so laudably completed. Therefore our friendly request is addressed to everyone, and particularly to our masters and employees, that they will give full credence to this open letter, willingly receive the before-mentioned Ludwig Rauch, by reason of his completed instruction and the qualities already noticed, into all fraternities, offices, guilds and other laudable associations and societies, and will extend to him corporate qualifications, advancement and their best assistance and good-will in all proper demands. Such conduct not only will he recognize with due thanks and true service, but we also are ready and prepared to reciprocate on all similar occasions. In witness whereof we have not only subscribed this certificate with our own hands, but have also affixed the official seal of our guild."

Done at Giessen, January 2, 1780.

Joh. Gottfr. Christ. Keller, chirurgus juratus ordinarius.

D. (Daniel, with a squint toward the contraction of Dr.) Bergner, Chirurgus.

At the top is the seal of Hesse. At the bottom the seal of the guild, with the inscription "Hasso-Giessenses chirurgi". This seal contains above a sun and hovering angel, beneath a patient upon whose left arm a surgeon in his surgeon's gown is performing venesection.

In the month of June Rauch went into the service of the landgrave of Hesse as supernumerary assistant surgeon (in the landgrave's own regiment), where he remained until, on the first of September, 1788, he went into the Austrian service in the regiment Preiss in Vienna. On October 2 he received the following diploma:

"His Roman Imperial Royal Apostolic Majesty's Counsellor, Knight of the Roman Empire, Lord of Carpiano in Austrian Lombardy, acting Chiriater and Protochirurgus of the Imperial Royal armies, Doctor of Surgery, Director of the Imperial Royal Josephine medico-chirurgical Academy and of its educational matters, Inspector of all military hospitals, first surgeon of the noble German Bodyguard, Fellow of the Royal Academy of Surgery at Paris, of the College of Surgery at Montpellier, and of the Academy of Sciences in Bologna, Mantua and Florence, Honorary Member of the Imperial Royal Academy of the Liberal Arts in Vienna —testifies hereby that Rauch, Ludwig, a native of Echzel near Darmstadt, in religion evangelical, 24 years old, having practised in the military hospital in Darmstadt, has attended the medical and surgical lectures in the Royal Imperial Josephine medico-chirurgical Academy, and has displayed both in his studies especial assiduity and in the treatment of internal and external diseases the requisite zeal; that he has been duly examined and found qualified to serve, and to be appointed, assistant surgeon, under the oversight of his superiors, in His Royal Imperial Majesty's army.

Signed at Vienna Oct. 2, 1788. J. Brambilla."

In 1788 followed a campaign in Syrmia, 1789 in Croatia, Bosnia, Servia, 1790 in Slavonia and Servia. Survived the plague.[1] Jan. 1, 1793 he was appointed superior surgeon of the travelling hospital at Heidelberg, Weissenburg and Hagenau, and in the stationary hospital at Baden-Baden, in the army-corps of the upper Rhine under the command of Ordnance-Master von Wurmser. Campaign, blockade of Landau, on the line of Weissenburg and in Alsace. — 1794 he became a regimental surgeon in the Hessian service, having received his discharge from the Austrian government

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[1] The "Pest-medici" and "Pest-chirurgi" of earlier date died out in the 18th century. Franz von Schraud was the last "Generalpestdirector" in Austria. The "Torture-doctors" also died out.

Here he shared in the campaign near Rastadt, in the Palatinate, near Mayence, on the Sieg and near Neuwied, from Rheingau to Bavaria. In 1806 was appointed staff-surgeon: campaign in Prussia, 1809 in Austria. There as major surgeon he was made a member of the Legion of Honor, and in 1810 received the title of "Stabsmedicus"; 1811 campaign to Magdeburg, Stettin and Damm, passes through typhus fever; 1811 becomes actual "Stabsmedicus" with the direction of the entire medical corps of the field hospitals and their attendants. Campaigns: 1811 Dantzic, 1813 Silesia, 1814 to France. 1819 his diploma as a knight of the Legion of Honor was renewed. Signature: Macdonald.— 21 years of campaigning. — Subsequently Doctor emeritus of the faculty at Giessen. Rauch's therapeutic principles were those of Brown, which were, indeed, for a long time almost obligatory in the Austrian army.

Such a career was certainly adapted to form capable surgeons and humane physicians, and accordingly many of the Medico-surgeons were men of this character.

The Josephinum, which was unquestionably of very great importance in the improvement of military medicine and the elevation of the position of army-physicians during the last century, has likewise attained historical significance from the fact that Brambilla, in opposition to the old-fashioned Faculty, extorted the recognition of surgeons as social equals of other members of the medical profession in Austria. When, however, no distinction was made between physicians and surgeons, the Josephinum occupied a difficult position, and so in 1820 it was closed for the first time. In 1822 it was, however, reopened, and from 1824. through the efforts of "Oberfeldarzt" Joh. Nepom. Jsfordik, it was provided with a complete curriculum of instruction like a university. In 1848 it was once more closed — in 1852 a so-called "felddienstliches Institut" was created by way of a change — then again opened in the reactionary period of 1854, but in 1870 it was done away with as a distinct institution with its own teachers for 11 years, though revived once more in 1884.

The first school of instruction in midwifery on German soil existed in Strassburg under the elder Fried as early as 1728. In 1737 a genuine school for midwives was erected here, in which (until 1870) instruction in the German language was obligatory, because the students did not understand French. Only rarely was a parallel course in French delivered for the benefit of pupils from Lothringia and upper Alsace.

The first institution for the education of obstetricians in Germany was erected at Göttingen in Hanover in 1751, and was under the direction of the ingenious Röderer. The latter (so little knowledge and fear was there of infection) was also the teacher of practical anatomy, like almost all professors of surgery before, and of midwifery long after this epoch. During the period of Röderer's activity here 20–21 births were under observation annually. In Berlin a school for midwives was organized, where obstetrical lectures for surgeons were also delivered. In the year 1788 the same arrangement was made in Jena, in 1782, through the influence of Venel, in Bern, and in 1790 for the first time in Marburg, while such an institution had been founded in Kassel as much as 30 years before.

In Würzburg C. C. von Siebold founded a famous school for surgeons and obstetricians, and provided further that only such surgeons of the city and country as had been examined by a commission should be received for instruction therein. The requisites for admission into this school were that

"The subject must possess good morals, sufficient mental capacity and corporeal strength, a sensitive heart, knowledge of the German and Latin languages, of course perfection in arithmetic and writing, sufficient means for the purchase of books and instruments" etc., from which we may infer that, even as late as the close of the 18th century, persons of no great education devoted themselves to surgery, and that a high preparatory education was out of the question.

In Brunswick the pupils of the school of surgeons in that place were required in 1780 to assist their teachers and hosts in practice, i. e. in shaving. Not until they had taken out their matricula were they freed from the business of shaving and permitted to wear a sword and carry a cane (!), privileges otherwise prohibited. The lectures in Brunswick also were free, but were delivered very irregularly and were plastered all over with learned citations.

Board and lodging with the prosector of the institution cost the elder Stromeyer here only 225 marks annually, though he had no room or light of his own, but was compelled to share the light of the servantmaid until he had extorted one from his host. Some old surgical instruments of his teacher were offered to him for purchase, and the wife of the prosector spoke of him contemptuously as "He". Yet Stromeyer, for a surgeon of the last century, sprung from a comparatively "good family", and had enjoyed a tolerably liberal preparatory education.

In Würtemberg, the land of the "thick-headed" Suabians, the ordinance for the examination of barbers and bath-keepers was very rigorous. It required of the "subject" to be examined not only a suitable bodily constitution but also satisfactory volubility — he must be "respondendo battant", ready of reply (observe the mixture of Latin and French scraps !) — and well-versed in manipulation. If such was not the case, the "subject, be he old, or be he travelled as much as he please, has he a wife (which any person in the world may get) and few or many children", he shall not be admitted a "Master", but shall be dismissed.

Separate lectures on widwifery were still exceptional at the universities. Almost the earliest were delivered by Heister at Helmstädt in 1754, and the latest at Tübingen in 1795.

At by far the most of the universities lectures on surgery and midwifery were combined throughout the whole 18th century, and this was the case at Giessen even at the beginning of the present century. — The instruction of midwives too, in spite of the schools erected for them in some states, was still in the hands of the "Physici" throughout almost the entire century, though, as we know, the physici themselves never practised midwifery. The German midwives, accordingly, received their practical schooling from older midwives, or on mechanical subjects or "phantoms". Indeed, the latter, even at the present day, serve exclusively to exercise students in the practice of the operations of midwifery, instead of the actual performance of operations upon the parturient woman under the oversight and guidance of the teacher. Were the latter system pursued it would never again happen that a young physician, after pulling off the limb of a child, could go away (as occurred as late as 1874) and leave the poor woman to be delivered by another physician.

In Denmark, in spite of the constant intrigues of the physicians against the surgeons, surgical instruction was finally given in 1736 (after the French system and in place of the private surgical lectures heretofore delivered) in an "Anatomico-chirurgical School" under the direction of Simon Crüger, and independent of the quarrelsome Faculty. At the instigation of the latter it was, indeed, kept closed in the years 1772–1784, but only to be revived in 1785 as the "Royal Academy of Surgery", in which instruction in surgery was again undertaken after the French method. — Balth. Joh. Buchwald, as early as 1720, instructed midwives in midwifery upon an improved system, but a lying-in asylum was first erected in 1760 by the famous Christ. Joh. Berger, and the education of midwives was connected with this institution. Physicians and surgeons were also admitted to this school.

In Sweden Samuel Amirillius first delivered lectures on surgery in Upsala, but Olof Acrel was the first to raise this branch to the scientific grade of his day, and to procure for it the respect of the physicians. Indeed from 1752 forward physicians were required to practise surgical operations, though up to this time surgery had been regarded an occupation unworthy of them (Hjelt).

Even Russia, in the interest of military hygiene, turned her attention to surgical schools. While in the 17th century physicians existed at the Imperial Court only, in 1789 a school for 150 inferior surgeons and 100 apprentices was erected in St. Petersburg, another for 50 under-surgeons and 100 apprentices in Moscow, and a third for 40 under-surgeons and 50 apprentices in Kronstadt. The salary of the professors amounted to about 3000 marks ($750) per annum, that of the under-surgeons to 450 marks and that of the apprentices to 150 marks.[1]

In England, where the barbers were not separated from the higher surgeons until 1800, instruction in surgery was given by individual private surgeons, and the only obligation laid upon the college or guild of surgeons was to deliver free lectures on anatomy. For this latter purpose they had a house of their own with an anatomical theatre, dissecting and operating room. Any other instruction must be paid for, as the teachers

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1. In the year 1880 there were in Russia 14,458 Doctors of Medicine, 1077 veterinary physicians and 312 licensed oculists and dentists. Of this army of doctors, rivalling that of Germany, 914 were found in St. Petersburg. In Charkow in 1881 officiated the "first female professor" since the days of Salerno, Madame **Iwanitzka.** — The American physician Dr. J. S. Billings estimated the total number of physicians of the world in 1881 at 180,000, of whom the largest share belonged to America (65,000) and the smallest (5000) to Spain. England was allowed 35,000, Germany and Austria 32,000, France 26,000 etc. The Medical Faculty of Paris in 1882 assumed the number of physicians in all civilized lands at 182,000.

had no salary. Stromeyer e. g., when he visited England to complete his education, was compelled to pay a fee of £18 for a single term, while for his dinner and lodging — he shared his bed, however, with a companion — he had to pay only 10s per week. — Obstetrical instruction was given from 1765 in the Lying-in Asylum of Westminster by Edward Ford, Brickender and John Leake, and in their private houses or lying-in asylums by the German Krohn, Thos. Denman and Wm. Osborne. [The separation of the surgeons and barbers in England was effected by an act of Parliament in 1745. The Royal College of Surgeons, however, was not incorporated until 1800. John Maubray is said to have given private instruction in midwifery in England as early as 1724, and Richard Manningham had a private lying-in establishment in his own house as early as 1736. At the instance of the Colleges of physicians and surgeons in Edinburgh, the city authorities appointed Mr. Joseph Gibson to deliver instruction to midwives in that city as early as 1726, but no chair of midwifery was established in the University until 1739. The College of Physicians in Dublin also established a professorship of midwifery in 1743, while the University of Glasgow postponed such an appointment as late as 1815. John Mosse of Dublin founded a private lying-in establishment as early as 1746, and in 1759, after the enlargement of this institution, he was succeeded by Sir Fielding Ould, who was probably a pupil of Grégoire. This institution is now the famous Rotunda Lying-in Hospital of Dublin. The British Lying-in Hospital was founded in 1749, the City of London Lying-in Hospital in 1750 and the Queen Charlotte Hospital in 1752. Fleury, physician to the Meath Hospital in Dublin, is said to have opened an obstetric policlinic in 1763. (H.)]

In Italy male midwifery elevated itself in a similar way, and the education of midwives was also improved. A school for midwives was erected in Piedmont in 1728, a similar institution with a two years' course at Padua in 1769, one in Rome 1786 etc.

In Holland surgery was taught in the universities as in Italy, for in both states surgeons were never so despised as in other countries. The instruction of midwives was placed in the hands of educated surgeons in their capacity as "Vroedmeesters", and even the most considerable surgeons did not scorn to impart instruction in this department.

How active was the zeal for the elevation of surgical instruction during the 18th century, and how general was the imitation of the example furnished by France, may be judged most decidedly from the fact that a surgical clinic was opened in Lisbon in 1762. Even twenty years earlier a "College" had been founded in Spain, and this was followed by two others to serve as schools of surgery. The equality of physicians and surgeons was effected too here, as in other countries, towards the close of the 18th century.

The only result, however, of the great improvement in surgical instruction in all places was that the armies of the different potentates were generally furnished with better surgeons, while private or civil surgery, even to the end of the century, continued almost in its mediæval condition. In like manner obstetrical private practice, particularly in Germany, still remained in a most wretched state. At most a tendency to improvement began to show itself in both branches in the larger cities.

Here and there "Stadtaccoucheure" were appointed in the 18th century. In Frankfort-on-the-Main e. g. this was done about 1749, in consequence of the difficult confinement of "Frau Rath" with Gothe, who, as we know, was born "blue" as the result of a protracted labor.

The barbers or lower surgeons educated in the guilds were still almost everywhere and exclusively the practitioners of surgery, and even the itinerant surgeon was still a permanent member of the medical faculty. Thus in the year 1704 the famous J. Andr. Eysenbarth (1661–1727), a highly privileged medicus and operator of Magdeburg, who was a type of the itinerant surgeon and whose name has passed into a proverb, treated the masses in the style of his class, i. e. he travelled from city to city with the necessary vehicle and retinue of such artists, had a theater and harlequin, in the former of which satirical pranks were exhibited, while beside it rope-dancing etc. were performed. Thus he trumpeted the fame of his skill and his remedies, sold the latter, operated on everything that came in his way, dragged out teeth etc. Even at that time it was somewhat customary for "actors, physicians, mountebanks and *id* (!) *genus hominum*" to act in this way. According to an earlier ordinance they were required to pay stallage, they could offer their art and science for sale for four days only, and must then move on to pursue their treatment in the same way somewhere else — a system which we may live to see restored, though in a somewhat "more modern" form, in these days of blessed free-trade with their "Doctores Philadelphiæ" and reduced practitioners. For the former and better regulated condition of affairs did not correspond to the German ideal of Manchesterism (which should legitimately play into the hands of Socialism) so entirely as it must do if the great war is to benefit Germany in this respect also. These itinerant doctors, according to all accounts, still made Germany unsafe in a medical point of view far down into the 18th century. Thus vagrant doctors received permission from the authorities to practise in Bavaria in 1756, and for the last time in 1772. But the fellows practised their tricks without any license for much longer, perhaps until swept away by the French wars. Old people still living on the Rhine can recollect such characters. Among the itinerant surgeons there were also some lithotomists, herniotomists, and particularly large numbers of oculists, who, before the days of Daviel, still operated everywhere in the old way and were genuine vagrant surgical sinners. Even Dudell said: "I operate on everything; if the operation succeeds, well and good; if it fails, the patients are yet no worse off than before, for then too they could not see." In operations for hernia they went not only at the hernia, but also at the very root of humanity itself, since as a rule they extirpated the testicles too.

Among the physicians proper the vast majority still scorned the practice of surgery, of which, on the whole, too they understood nothing. Still they claimed the right to be called in as spectators of everything done by the surgeons, and of course to be paid for their attendance. In many quarters this was still the case in the first half of the 19th century, for the author recalls from his youthful days a certain "Physicus", who, as a medicus purus, in the case of even the simplest wounds, and of course much more in cases of fracture, always had every surgical manipulation performed under his own oversight (i. e. in the presence of his learned Highness who knew nothing whatever about surgery) by a local surgeon handed down to our century.

Throughout the whole century the stationary and itinerant surgeons were almost the sole male practitioners of midwifery, for the physicians only rarely devoted their attention to theoretical obstetrics, and any practical knowledge of this branch was quite exceptional. Nevertheless the latter demanded to be called in to cases of midwifery also, and this course was followed the more readily since the surgeon still put himself under the control of the physician, because he himself, in a social point of view was not very much respected. Male midwifery too was in general a rare matter, in fact so rare that in the Prussian medical tariff of 1725 the quotations for this service are entirely wanting, and this blank continued in Bremen as late as 1854, though it was filled up in the Hessian tariff of 1767. On the whole, with the exception of a few university towns and larger cities and their vicinity, the practice of midwifery still occupied almost its mediæval position. Even the forceps were not commonly employed before the close of the century, and Deisch and his companions tortured their wretched patients at their own sweet will, in fact so far that in Frankfort-on-the-Main about 1760 the heads of children and the uteri of the mothers were still frequently torn away (Stricker). But male assistance,[1] even of this kind, during the first half of the century was only resorted to when everything else failed — when the midwives had exhausted their strength and skill in the use of the labor-stool, inunctions, manual twistings and external pressure "of their hand-racks" etc., for they were no longer allowed to operate with instruments. In the most favorable cases recourse was then had to rude efforts at version, but in the majority of cases the surgeons resorted to the mediæval operations of dismemberment, cutting in pieces, tearing away limbs etc., under which treatment often a quarter or more of the mothers died.

"When they (the surgeons) were called to do anything, or really did anything, they came with hooks and pitiably tore into many pieces the children within the womb, whom very frequently they might have got hold of with their simple hands, and thus prevented what so often happened, the laceration of the womb of the wretched mothers with their hooks in addition to the children, and the risk of the mothers' lives."

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[1] The epidemics of puerperal fever, which at an earlier day were so frequent in the university lying-in hospitals, have been often ascribed to the union of the professorships of anatomy, surgery and midwifery. Even during the student life of the author in Giessen no one considered it necessary after using his hands in anatomical researches, to disinfect them before practising the obstetrical toucher.

From the second half of the century the midwives were educated in schools pretty much like those of the present day, and enjoyed too the same "higher" education which they possess to-day. In the Prussian medical tariff even the quotations for their services were wanting, but they are to be found in the Hessian tariff which appeared 52 years later.

The first school for the instruction of men in midwifery, outside of Paris, was erected, as we have said, by the elder Fried in Strassburg. A practical school for midwives was erected here in 1737, and in it (until 1870) instruction in the German language was obligatory, because the pupils did not understand French. Rarely only was a parallel course in the French language given for pupils from Lothringia and Upper Alsace. Fried educated many pupils, who then introduced into Germany a better practice and were also better instructors of midwives. Instruction under Fried cost, with incidental expenses, 300 marks ($75). Observation of a single case of labor in the city and in presence of a midwife cost about 11 marks. Lectures alone, delivered evenings from 6–8 P. M., were 120 marks. At all labors in the hospital two pupils were allowed to take part, and to make examinations under the direction of their instructor. The female pupil (Lehrtochter) of the hospital midwife also assisted. The midwives of the city, together with their pupils, were required to attend once each year the dissection of a female (if possible a pregnant woman), so as to learn to know the parts, and to attend the bi-weekly lectures under penalty of a fine. Of the six "sworn city midwives" (they were regular officials), each was permitted to take one pupil under her practical instruction for a year, and each of these pupils was then required for another year to receive theoretical instruction from the teacher of midwifery. They were then examined by the Physicus, pro-dean and instructor of midwives, and received a certificate. They were also required to pass a written examination before the six "sworn midwives", after which they were themselves sworn, and expected to take pupils, though only for the country — each of them two (Wieger). The superior midwives had a sign with the arms of the city upon their house, while the six examined "Lehrtöchter" were "Vortauferinnen" (i. e. they held the infants at baptism), and enjoyed the right of putting out a sign without the arms of the city.

The barbers were still looked upon generally as members of the medical profession, and were designated as surgeons. They furnished the figurative, and for the most part also the actual, fathers of surgery. Most of the great surgeons of the last century proceeded in both senses from their ateliers, and in their youth had flourished the barber's-bason. Indeed shaving, cutting corns etc. were looked upon as necessary preliminaries to proper surgical study until towards the end of the century in almost all quarters, and in certain parts of Germany until a still later period. The cosmetic department of the business of the actual guild-masters was, however, mainly performed by their apprentices and pupils. The barbers were permitted or expected to undertake nothing but the treatment of external diseases; the bath-keepers, who are still mentioned in the medical ordinance of 1725, were required to abstain even from this, and could only shave etc. and keep bath-houses. They were united with the barber-surgeons into a single guild in Prussia in 1779, and in Würzburg the guild of bath-keepers was not abolished until 1787.

Among the better surgeons the apprentices were already called assistants, and the elder Stromeyer paid one of these assistants a salary of 300 marks.

In the 18th century actual surgeons for the first time attained the rank and office of professors, standing on a level with the professors of medicine, though not exactly recognized as equals by the latter, while heretofore surgery had been taught by professors who, during the whole course of their life, had never performed even a venesection. These new surgical professors were now actual surgeons, most of them men very well educated in their department and schooled practitioners. Some of them were genuine models as writers and greatly enriched their department of knowledge, indeed, on the whole, they were superior in this matter to the physicians, who were too devoted to the pursuit of theories. Not a few of them belong among the greatest surgeons of all time! Undoubtedly they were favored by the time, inasmuch as the department of surgery still required, in many respects, to be newly constructed.

Of course each potentate had his body-surgeons as well as his court-surgeons. The royal body-surgeon in Hanover at the close of the century received a salary of 2400 marks ($600), and the court-surgeon half of this sum.

District surgeons had the duties of a state physician, but were subordinate to, not adjuncts of, the Physicus.

The city surgeons, as a rule, were more highly educated in their department and occupied a higher rank than the provincial or country surgeons. The most of the latter were nothing more than rather superior barbers, which latter class now generally called themselves "Chirurgi".

In Germany the jealousy of the physicians against the surgeons, even as late as among the eighties of the last century, went so far that the medici puri in Berlin, the city of intelligence, compelled the surgeon Gilly, who had got him a horse and carriage in order to attend to his practice, to discard these and return to his practice on foot.

The burning question as to the equality of medicine and surgery was also discussed frequently with the pen. The scorn for the latter branch went so far that even the students here and there, e. g. in Freiburg, rebelled against their teachers and even threatened violence when the latter argued in favor of the union of the two branches. At the present day the feeling is reversed; at least the man who speaks of a separation of the two is regarded with a shrug of the shoulders — and yet operative practice has become almost a monopoly of the professors, since the general physician *cannot* acquire the special education necessary therefor.

Besides the native surgeons, there were in the first half of the 18th century very many French surgeons practising in the chief cities of Germany. These were regarded as better surgeons than the Germans, and originally enjoyed special legislation of their own in the French colonies within the German cities, and particularly in cities which were occupied as royal residences. This arrangement was changed in Prussia in 1725. Subsequently there was considerable difficulty in getting rid of these arrogant guests.

In neighboring Denmark the condition was, on the whole, the same as in Germany. Physicians and surgeons occupied a position of hostility towards each other; indeed, in accordance with the national character, this hatred was still more biting and unextinguishable than with us. In like manner the male obstetricians and the midwives maintained an active feud with each other.

In France, at least in the capital and the larger cities, surgery enjoyed better representatives than in other countries, in accordance with the better educational arrangements introduced into this country at an early date. In like manner male midwifery, the foundation of which had been laid during the 17th century, was generally naturalized there in the cities and among the higher classes. In the provinces well educated midwives at least were to be found. — The Faculty and the surgeons, however, still quarreled in the mediæval style, as they had done ever since the founding of the Collége de St. Côme by Pitard, and their strife was really never concluded until the abolition of the universities.

In Holland, as in Italy, surgeons and male obstetricians were held in greater esteem.

The same may be said of England, where, as in Holland, the public speedily decided in favor of male midwifery, although here instrumental methods, particularly the forceps, were too frequently employed.

England has been always distinguished by peculiar medical arrangements, which, since their first regulation in the year 1461, have remained almost entirely unchanged.

The English universities are much less the exclusive and proper educational centres for physicians than is the case with us. They consist of a number—12-24—of so-called "Colleges", in which the pupils, who subsequently become "physicians" only (medici puri), are brought up quite monastically as in our "Convicten". They study chiefly the literæ humaniores, while professional studies are very defectively cultivated, so that students of medicine, having obtained the degree of doctor from the universities, now begin their special studies in foreign universities, or in the so-called hospital-schools of their own country, in order to complete their defective professional education. [This description applies chiefly to Oxford and Cambridge, which have no medical faculties proper, though instruction in anatomy and physiology is given. The universities of Scotland and Ireland have generally complete medical faculties, and that of the university of Edinburgh is deservedly famous. The degrees of Baccalaureus and Doctor Medicinæ and of Bachelor and Master of Surgery can be conferred only by the universities, though the license to practise may be obtained, as we shall see, from various other examining bodies. H.]

At the head of the universities, which depend upon foundations and are entirely independent in their management, while they retain and anxiously and energetically defend their ancient privileges, stands a chancellor and with him a vice-chancellor. The supreme judicial authority and defender of the rights of the university is the high steward, and his assistants, so to speak, are the proctors. The latter maintain discipline among the students in the colleges as well as among those outside of these institutions but residing in the university cities. The students bear various titles such as scholar, exhibitioner, sizar, nobleman, fellow-commoners, pensioners etc. The teachers are called tutors, and are assisted by the fellows. All the officials thus mentioned receive their salaries from the universities alone. A number of students too are educated at the expense of the university, while others defray themselves the entire expense of their education, or at least a part of it. Those scholars who do not reside in the college buildings are domiciled in so-called "Halls", i. e. private institutions, where they are supplied with board and lodging and receive instruction. The method of instruction is still quite scholastic, and the attainment of the degree of "Doctor" still confers great respect.

Besides the universities there are, in connection with the great hospitals, *hospital-schools*, the arrangement of which corresponds in the main with that of our medical faculties. The teachers in these schools are the physicians to the hospitals, and others chosen to the honorary office of teacher from among the more eminent practitioners. The latter have no salary or a very trifling one, and are also consulting physicians or surgeons and operators in the hospitals. The hospitals have their auditoria, dissecting-rooms, laboratories, libraries etc.

In London e. g. such schools, supported by private foundations and the proceeds of the places obtained by annual purchase, exist in connection with the famous hospitals of St. Thomas, St. Bartholomew, St. George, The London Hospital, Guy's (founded in 1724 by Thomas Guy, a London bookseller), Charing Cross Hospital, Middlesex Hospital, St. Mary's Hospital, Westminster Hospital etc. [Medical schools are also associated with the hospitals of King's College and University College in London, though here the medical faculties are united with other faculties into universities.] The course at these hospital schools lasts three years. Of the hundreds of students who attend these schools a small number are assigned to each house-physician for practical or clinical instruction. The fees for instruction, the use of apparatus, library etc. are either paid in a single payment at the beginning of the course, or in annual payments until the fixed sum is completed. These fees too are quite moderate, amounting to about £90. — The pupils of the universities proper also frequently enjoy practical instruction in these schools.

A final examination determines the question of capacity for practice. This examination is not conducted by the state — though an effort was made in 1874 to introduce a state examination — but by the teachers themselves, as a matter outside of state control.

Authorization to practise likewise is not given by the government, but by the elective presidents of the societies of the various classes of educated physicians who exist in England. These societies are entirely independent of the government and are known as the Royal College of Physicians, Royal College of Surgeons and the Society of Apothecaries. [There are some nineteen of these examining boards, including the faculties of the various universities, the Royal Colleges of physicians and surgeons in London, Edinburgh and Dublin, the Faculty of Physicians and

Surgeons in Glasgow, the Society of Apothecaries in London, Apothecaries Hall in Ireland etc., all of which are by the Medical Act of 1858 responsible for their actions to the General Council of Medical Education. By the same Act it is made the duty of the General Council to see that the various examining boards exercise their functions in a discreet and impartial manner, and if necessary to punish any improprieties on their part by reprimand, or in aggravated cases by the withdrawal from the offending board of its right to give diplomas.] Each of these societies has a list of its members (medical directory) and those only whose names are borne upon this list are regarded as physicians, while all others — practice is absolutely free — are looked upon as quacks. These colleges also control the discipline of the medical profession, and maintain its honor in a strict and efficient manner. A physician who advertises himself frequently or conspicuously is regarded as a quack; the same is the case with homœopaths etc. Whoever offends against medical decorum may be struck off from the list of the colleges — the supreme penalty.

The three classes of physicians existing in England are accordingly the following:

1. Physicians proper, pure internal physicians, corresponding to the earlier medici puri. They are recruited from the students of Cambridge, Oxford etc. They are prohibited from performing any, even the most trifling, surgical operation, so that e. g. in 1835 Dr. Little, who had performed subcutaneous tenotomy, was compelled to vindicate himself by arguing that tenotomy was not of the nature of a surgical or external procedure — because it was performed beneath the skin and was bloodless. The physicians, of course, attain a considerable practice only slowly, yet, in spite of this fact, they all claim the same fees as the most popular and famous practitioners. Thus for each visit and consultation they receive a guinea, and whoever takes a less fee degrades himself in the eyes of his colleagues. The system of making visits too is not the same as with us. English physicians visit their patients but seldom — every day, or every other day; it is only in cases of extreme danger that more frequent visits are made, and this is true for all their clientèle without exception, whether they are more or less wealthy. However they also make friendly calls, which are not charged, and have certain limited hours for office consultations. It is only in extremely pressing cases that they accept for the same day patients who have not been announced before their hours of visitation. Most such patients are compelled to wait until the next day. Many physicians of London and other cities go into the country from Saturday afternoon until Monday, in order to secure rest and refreshment. Those patients who cannot wait until the return of their own physicians are forced to select another for temporary employment.

2. Surgeons, i. e. pure surgeons. These attend none of the universities, but most of them become pupils of an old practitioner or surgeon before visiting the hospital schools at the conclusion of their studies, in order to obtain complete theoretical knowledge. They receive the same fees and take the same rank as the physicians. Nor are they prohibited from prescribing internal medicines. Oculists are counted also among the surgeons. — The same course of instruction and study is also followed by the

3. Apothecaries. These are likewise called General Practitioners, inasmuch as, like the German physicians, they practise in all branches. They form the class of family physicians. Their fee is usually half a guinea for each visit or consultation. The apothecaries also form the ordinary obstetricians and dispense their own medicines, which they procure from the Apothecaries' Hall.

The last two classes of physicians do not decide upon the practice of one or the other branch of the profession until the close of their education in the hospital schools, but, this selection once made, they are distinguished from each other, though both departments may be united in the same person. While the future surgeon obtains his license to practise from the College of Surgeons alone, and the apothecary from the Society of Apothecaries alone, he who desires to obtain authority to pursue both kinds of practice must obtain a license from both colleges. The physicians in 1805 formed the "Medico-chirurgical Society", which publishes the famous "Medico-chirurgical Transactions." This society also possesses foreign members.

The English physicians enjoy complete independence and self-government. That, since the state has made practice completely free, there is much quackery is a matter of course: still quackery does not preponderate over the practice of the regular physicians, since the latter are very careful of their professional honor before the public, and avoid in every possible way the slightest contact with quacks, and far more anything like community with them. This feeling is carried so far that one of the most famous English physicians who *accidentally* met a homœopath at the bedside was compelled to publickly vindicate his conduct.

The English "chemist" is represented by our apothecary. He merely offers drugs for sale and puts up the prescriptions of the physicians and surgeons, [but is entirely unauthorized to practise. The same may be said of the druggist.

Perhaps a more definite idea of the divisions of the English medical profession will be given the American reader if we say that the functions of the English "physician" proper (the possessor of the university degree of M. B. or M. D.) correspond in some degree to what we understand by a "consulting physician", while the English "apothecary" (enjoying the diploma of the Apothecaries' Society) corresponds to our ordinary family and general practitioner, and the "chemist" or "druggist" to our apothecary. The English apothecaries were legalized by an act of Parliament in 1543, and formed into one of the city companies together with the grocers by James I. in 1606. In 1617 they were separated from the grocers and set up for themselves under the title of the "Apothecaries of the city of London". Their claim to the right of prescribing for patients as well as of dispensing medicines was a chronic subject of dispute between the apothecaries and physicians, and led to the famous "Dispensarian Campaign" between the College of Physicians and the Company of Apothecaries toward the close of the 17th century, in which the physicians appeared to no great advantage. The quarrel was finally settled in favor of the apothecaries by the House of Lords in 1703, and gradually the victors have largely withdrawn from the business of dispensing medicines, preferring the more honorable duty of prescribing, and abandoning the dispensing of drugs to the "chemist and druggist". Jeaffreson says "Prior to 1788, it is stated on authority, there were not in all London more than half-a-dozen druggists who dispensed medicines from physicians' prescriptions. Before that time, the apothecaries — the members of the Apothecaries' Company — were almost the sole compounders and preparers of drugs. At the present time it is exceptional for an apothecary to put up prescriptions, unless he is acting as the family or ordinary medical attendant to the patient prescribed for." The Apothecaries' Company was authorized in 1722 to visit all shops in London and destroy drugs unfit for use. In 1748 they were authorized to appoint ten examiners without whose license no person might compound or sell medicines in London or for seven miles around that city, and in 1815 a board of 12 members of the Apothecaries' Society was empowered to examine and license all apothecaries in England and Wales. In 1858 the licentiates of this society were authorized to act in Ireland and Scotland also.

The separation of the surgeons and barbers in 1745 has been already mentioned, as well as the incorporation of the Royal College of Surgeons of London in 1800. Either physician or apothecary may acquire the additional diplomas of the Royal College of Physicians or the Royal College of Surgeons, in which event he is entitled to the title of M. R. C. P. or M. R. C. S. Finally, as the possession of the diploma of the latter great corporations in itself authorizes medical or surgical practice, a large number of practitioners in England have neither the university M. D. nor the diploma of Apothecaries' Hall, but simply that of the Royal Colleges of physicians or surgeons. H.]

Medical arrangements in America have been from the outset similar to those of England, but continued until a short time since entirely unregulated, practice free etc., and without the English self-government. The latter is now just beginning to show itself, so that quackery in the United States has overgrown reputable practice.[1]

[The earliest medical school founded within the United States was the institution now known as the Medical Department of the University of Pennsylvania, founded by Drs. John Morgan and William Shippen at Philadelphia in 1765. This was speedily followed by the school now known as the College of Physicians and Surgeons of New York, established in 1767 under the charter of King's College. The Medical Department of Harvard University was founded in 1782; the College of Philadelphia, in 1790, and the Medical School of Dartmouth College in 1798. H.]

By degrees all the states of the Union have established colleges and universities, many of them several institutions of this kind, so that in 1836 there were in the United States no less than 79 universities and colleges, though of course of quite a different kind from those of our own land. Of these institutions 38 enjoyed the right "to make doctors" — a manufacture in which, as we know, Philadelphia has recently greatly distinguished herself. [According to Dr. John S. Billings, there had been established in the United States down to 1876 no less than 84 medical schools authorized to confer degrees in medicine, and of these 59 were still existing at that date. Five of these colleges were founded in the 18th century, and the number of their graduates down to the close of that century is estimated at 221.] Most of these institutions are private foundations. — The first physicians in America were the missionaries and priests, a phenomenon renewed also in the beginning of American medical culture. Subsequently physicians wandered to the new colonies, many of them the refuse of the profession among other nations. This is no longer the case, but America may be looked upon as the model of a state in which physicians, who make a complete business of their profession, dwell under regulations of absolute free-trade. Yet recently the medical profession in America has elevated itself both scientifically and practically by the inauguration of a strict professional code, though even now, in consequence of the complete liberty of practice, an excessive number of male and female quacks continue to ply their trade. This is done to even a criminal extent in numerous cases, so that recently strict laws against such practices have been passed, while similar laws to restrict the sale of quack remedies have likewise appeared, though certainly they do not seem to have been executed. "Any person who prepares, has prepared, has in his possession, or conceals, obscene medicines, or induces another to prepare or to sell such remedies, or who only advertises them, shall, if over 21 years of age, be punished by imprisonment at hard labor for two years and a fine of $100–$5000, or, if under 21 years of age, with three months' imprisonment and a fine not to exceed $500." Since the establishment of medical free-trade in Germany even the American code has been taken as a model for our country, an appearance of retrograding civilization which excites much reflection upon the conditions with us. In recent times American medicine, however, has become in many respects the teacher of the European, a phenomenon historically explicable from the younger civilization of the New World, and even pointed out by old Göthe:

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[1] Unless the definition of "quackery" is made *very* comprehensive, this is a rather exaggerated description of a state of medical affairs by no means satisfactory. (H.)

"America, du hast es besser,
Als unser Continent, der alte!" etc.

[It should be borne in mind that the above rather pessimistic account of medical affairs in the United States was written prior to 1876, since which date many medical reforms have been introduced in various states. Still it cannot be denied that there is yet abundant room for improvement in our medical relations. The subject, however, is far too extensive to warrant discussion in this place. H.]

According to the medical tariff of the Royal Prussian Collegium Medicum, published in 1725, the first visit to the house of the patient in a case of ordinary disease was charged at one thaler;[1] in case of an infectious disease (except the plague) two thaler. Each visit without writing a prescription, in a case of ordinary disease, 8 groschen, and if a prescription was written, 12 groschen: for the same in cases of infectious disease, 15 groschen and one thaler. The first consultation, to each physician, one thaler; for each subsequent consultation, 12 groschen. A night-visit, one thaler. Visits requiring the physician to travel some distance were charged at two thaler for each (German) mile, and two thaler for each day the physician was absent from his home. The cure of venereal disease was a matter of private arrangement between physician and patient. The poor were to be treated gratuitously. Surgeons were allowed for dressing an ordinary wound six groschen (14 cents); for elevation of the bone in depressed fracture of the skull 10–15 thaler and, if the use of the trepan was required, 2–3 thaler for each application of this instrument. Fractures in old persons were treated for 10-16 thaler, and in young persons for 6–10 thaler. Travel was charged at 12 groschen (29 cents) for each (German) mile, and one thaler for each day's absence from home.

This tariff-ordinance was not substantially different from that of 1685. It prevailed during the 18th century and (inasmuch as it was for the most part simply renewed in 1815) also holds good down to the present day.

According to the medical ordinance adopted for Hesse in 1767, the first visit to a case of ordinary disease cost 10 albus,[2] 8 heller; in a case of infectious disease, 21 albus, 4 heller; night calls 10 albus, 8 heller; visits to the country, without travelling expenses, 1 rixthaler, 10 albus, 8 heller; the cure of venereal disease 10 rixthaler or more, according to circumstances; post mortem with report, 2 rixthaler.

Surgeons were allowed for trepanning 3–6–10 rixthaler; for catheterization 1-2 rixthaler; herniotomy, 8–10–15 rixthaler; Cæsarean section 5–8 rixthaler; lithotomy 10-12–20 rixthaler; treatment of a fracture 5–10 rixthaler; gun-shot wounds 5-10-12 thaler; venesection 4–5⅓ albus; enemata 10–16 albus; extraction of a tooth 2⅔-5⅓ albus; a surgical (!) night-watch, 10–16 albus; the treatment "luis venereæ per salivationem" (never to be undertaken without calling in a physician) without board and lodging (!), 8–12–16 rixthaler; etc., etc.

The tariff for medici and accoucheurs allowed for an examination before birth, or for personal assistance and counsel during labor, 1–4 rixthaler; for a natural accouchement, accomplished without aid, 3–5–6 thaler; for version before the escape of the waters, 5–6–8 thaler; after the escape of the waters, 6–8–10 thaler; for an instrumental operation, 8–10–12 thaler; Cæsarean section, 10–15–20 thaler; the same operation after the death of the mother, 8–10–12 thaler; reposition of a prolapsed uterus, 2-3-4 thaler; operation for the removal of a polypus uteri, 4–6–8 thaler.

Midwives received for a visit at request before accouchement 3–6–8 albus; for

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1. The thaler consisted of 30 groschen, and was worth in our present money about 70 cents. (H.)
2. An albus was equal to 9 heller and was worth in our present money about 2¼ cents. The rixthaler may be computed at about 70 cents. (H.)

attendance during labor, according to time required, circumstances and people, 1–2–3 rixthaler; for each visit after confinement, 1–2 albus; for enemata, 4-6-8 albus; reposition of an incomplete prolapsus uteri, with the application of a pessary, 10–12-16 albus; where the prolapse was complete, 16–20 albus.

We have quoted the above tariff ordinances quite freely because they furnish us a safe guide as to the valuation of medical professional services in the 18th century, and give us a basis for a comparison with the 19th. This will establish the fact that in the 18th century, as generally at an earlier period, physicians were socially much better situated than in our own day, although in the second half of that century the view of the authorities had found expression that the services of the physician could be cut down to half groschen or even to heller, and that their performance need not be looked upon as an art but as mere mechanical labor. At an earlier period, considering the small number of physicians and the high (triple) value of money, the proverb "Galenus dat opes", still held good to some extent; now, however, when the proverb should read "Galenus dat nickel", the following comparisons are significant.

In the year 1224 according to the medical tariff of Frederick II. the physician, for a visit at the residence of the patient, received a fee of 60 pfennige, that is to say, in the present value of money, at least 6 marks. For visits outside of the city his fee was 3 marks, 60 pfennige, or in our money about 36 marks! At least Kriegk estimates the relative value of money at this period, compared with that of the present time, in this ratio. In the beginning of the 16th century the physician was paid 85 pfennige per diem, equal to about 5 marks at the present day. In the 18th century, as we have just seen, the tariff was still tolerably high.[1] At a later period, however, matters got worse! In spite of the enormous depreciation in the value of money, the first visit at the residence of the patient, according to the Hessian tariff of 1865, costs 85½ pfennige to 1.71 marks; in the next four weeks 45¾ to 85½ pfennige; from the fifth week forward, only 35 to 70 pfennige! Vaccination costs 25 pfennige! In England and Sweden[2] only has the pay of physicians at the present day remained at its mediæval standard. We see that German physicians have every reason to wish for the return of the Middle Ages in order to better their condition!

Apothecaries during the 18th century attained a better scientific education in Germany, and were more respected socially and better protected by the state than heretofore. since the authority to dispense medicines was withdrawn from the druggists, grocers etc.

A passage in the medical ordinance of Hesse in 1727 reads: "The sale of the following, and other articles which belong to the pharmacies, such as etc. . . . . is forbidden without special license to all dealers and traders, under penalty of a fine of 17 marks and confiscation of the goods, since not only the pharmacies are injured thereby, but the common people too are often endangered in life and limb. Peddlers of theriaca, itinerant dealers and other mountebanks and old women are forbidden to either sell medicines or to practise secretly." For each violation of this ordinance the offender was to be punished by a fine of about 9 marks, and beaten according to the decision of the authorities — the latter a punishment still very common and certainly very effective also.

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[1] The necessaries of life at this period were about four times cheaper than at present. In Darmstadt a pound of meat cost only 16 pfennige; 100 kilos (220 pounds) of barley, 5 marks; of wheat, 7 marks, 20 pfennige; 2 litres of lagerbier cost 12 pfennige; 8 eggs, the same etc. [1 mark = 100 pfennige = 24 cents.]

[2] In Sweden there in one physician to every 8500 of the population: in Denmark 1: 3000; in Norway 1: 4784. In the last country the mortality amounts (therefore?) to only 1.7 per cent. In Vienna, on the other hand, there was in 1887 one physician to 858 inhabitants.

The same action was taken in France with regard to the grocers, into whose hands the entire wholesale dealing in drugs now passed. Permission to carry on the business of an apothecary in Prussia was made dependent upon an examination before the Collegium medico-chirurgicum and a certain definite term of practical experience in a pharmacy. Pupils and assistants or dispensing-clerks, on the other hand, pursued their studies with masters, as at an earlier period; for a special school for pharmaceutists was not established in France until the year 1777 under the form of the Collége de Pharmacie, while at the same time masterships and sworn members of guilds were abolished. The Collége was a private association, which, by permission of the state, controlled the relations of the pharmaceutical profession.

It was composed of actual or titular master-apothecaries, and had for its board of directors: the four apothecaries-in-ordinary as honorary directors; four active directors and twelve deputies. The active directors, together with the medical faculty, had charge of all inspections; they were elected to their position. Twice a year there were general meetings. With the exception of the pupils in the Hôtel-Dieu and in the Hospital for Incurables, all apothecaries were required to pass an examination before this college. All pupils were entered in its register, and even changes of situation were to be announced and recorded.

The instruction consisted in free courses of lectures on natural history, botany, chemistry, and pharmacy. These lectures were public, and were delivered by three demonstrators nominated for six years at the general meetings, each of whom had an assistant.

After the Collége a so-called free Société de Pharmacie was formed, and this in 1796 erected a free École de Pharmacie. The Collége existed still for a long time with the École.

In Germany there were nothing but private schools for the education of apothecaries. Most of the latter were instructed by other apothecaries, and, on the expiration of their apprenticeship, received a certificate of instruction.

To the earlier apothecaries-in-ordinary were now added court and travelling apothecaries, i. e. apothecaries who accompanied the high lords upon their travels, in place of the simple medicine-chests of earlier days and which even the Egyptians possessed.

The practice of medicine was prohibited to the apothecaries, and their pharmacies were subjected to a still stricter inspection. In Prussia, Neumann was the first general inspector of the pharmacies.

The pharmacies for a long period passed into the hands of new owners either by inheritance or by marriage, and in Frankfort-on-the-Main e. g. it was not until 1757 that a pharmacy was sold (Kriegk).

Ordinary veterinary practice continued entirely in its mediæval state. Equerries, farriers, shepherds, old women etc. were the popular practitioners, for the veterinarians or "Rossärzte", educated in the veterinary schools, had not as yet attained private practice. The common practitioners of veterinary medicine at this period (as often even at the present day) directed their practice against witches, enchantments, the devil incarnate etc., employing charms, pouring down devil's-drinks and the like. On the other hand the 18th century produced the first professors of veterinary medicine. The earliest of these appeared in France, but in 1777 a school for the education of army veterinarians was founded in Vienna, with Scotti, Mengmann and Heller as its first teachers. A similar school was opened in Dresden in 1780, and in Berlin in 1790. For the first time too since the days of the Ancients a regular veterinary army-service was essayed, the French assuming the initiative, while the Austrians and Prussians followed their example.

Joseph II. on the opening of the veterinary school in Vienna decreed that no one who attended this school and exercised himself in the anatomy of dead horses, whether he were a civilian or a military official, should be regarded as having injured his reputation, but that such conduct should rather be looked upon as meritorious. "No one, therefore, under penalty of my disfavor and severe punishment, shall cast any unbecoming reproach upon another on this account. In like manner the farrier's-apprentices who attend this useful school and produce the certificate of their teacher that they have obtained good ability in this branch, shall be preferred to the rights of a master in the guilds of all my hereditary lands before others, and even before the sons of masters and those who have married a master's daughter" (We see that certain advantages are associated not only with the daughters of professors, but that similar advantages accrued, even in that day, to a marriage with the daughter of the master of the guild). "In the regiments too no other persons shall be accepted as farriers."

Army medical affairs made some advance in the 18th century, though in the year 1705 in Prussia, which may be taken as a sample, they were still so imperfect that of 35 regiments — standing armies were now introduced everywhere — only six were sufficiently supplied with regimental surgeons. This advancement was rapid, and proportioned to the improvements in surgery and surgeons and the demands of an improved system of warfare.

While heretofore the officers alone had charge of the surgeons, the appointment and oversight of the company surgeons was in 1712 transferred to the regimental surgeons. The title of "Generalchirurgus" was conferred upon the regimental surgeon of the guard, and in 1716 this title was converted into an actual office. The first actual Generalchirurgus and surgeon-in-ordinary, and as such chief of the department of surgeons, was Ernst Conrad Holtzendorf (1688–1751). Even before his day — as early as 1713 — the rank of the regimental surgeons had been raised; they now stood just under the chaplain and above the drummers, but were yet subject to punishment with the cane. They now advanced too towards a better education. In the first place some of them were sent abroad, particularly to France, and the Collegium medico-chirurgicum was erected.

after the plan of the theatrum anatomicum, for the better education of regimental surgeons at home. The military physicians educated here and in the practical school of the Charité were called "Pensionärchirurgen". Before their appointment in the army they were required to pass the examination of city surgeons and operators. The company surgeon was required only to shave, to visit the sick and wounded and to report to the regimental surgeon and the captain. He was not permitted to treat patients independently. (Frederick the Great, "in order to always obtain better subjects for the military service", appointed in the year 1744 twelve French surgeons.) Patients dangerously ill or personally important were brought to the regimental surgeons, who had to report to the colonel commanding. Cases of singular or unusual death required a post mortem examination.

Besides the surgical faculty, there was still a perfectly distinct medical faculty, employed chiefly for consultation. This consisted of the regimental medici, over whom a "Generalstabsmedicus" was appointed in Eller. In garrison towns and fortresses "Garnisonsmedici" were also created.

Instead of the one "Generalchirurgus" of an earlier period, there appeared after 1767 three of these officials, of whom the first acted as chief. Besides these, there were also several other titular "Generalchirurgi". In 1787 the office of the "Bataillonschirurgen" was created. It always belonged to the first of the four regimental-surgeons.

Salaries of the Prussian army-physicians during the 18th century.

Year.			M.	Pf.
1771	Regimental surgeon Brandhorst	monthly	45	—
	The surgeons also received "Seifegroschen" for soap.			
1723	Generalchirurgus Holtzendorf	annually	900	—
1725	Regimental surgeon of cavalry	monthly	318	—
	Of this sum each surgeon of a squadron received 18 marks, and the regimental surgeon was required to keep in order the medicine-chest and chest of instruments.			
	Regimental surgeon of infantry	monthly		
	as staff-pay		36	—
	from each company		30	—
	On the other hand, he was required to give to each company-surgeon 10 marks, and to keep in order the medicine-chest etc.			
1726	Regimental surgeon of infantry	monthly	33	—
	In addition from each company		24-30	—
	For medicine, from each man about 10 pfennige, about		180	—
	Total monthly		237-243	—
	Company-surgeon	monthly	12	30
	and could no longer, as heretofore, enjoy civil practice.			
	Regimental surgeon of cavalry	monthly	13	40
	In addition for medicine		180	—
	Surgeon of the squadron	monthly	19	40

Under Frederick II. the salary continued the same as heretofore, but the fees for medicine were higher, since the size of the regiments was increased. Thus

		M.	Pf
the regimental surgeon received altogether,	monthly	318	30
Company-surgeon	monthly	10	50
Battalion-surgeon with medicine fees	monthly	135–144	—
Regimental surgeon of cavalry with fees for medicine.	monthly	78	—
Surgeon of the squadron	monthly	19	40
Superior surgeon of artillery	monthly	45	—
Surgeon	monthly	15	—
Generalchirurg Theden	annually	1500	—

Under succeeding rulers the salaries remained the same.

In 1782 the squadron or company surgeon in Hanover received pay of 6 thaler per month. The elder Stromeyer, accordingly, at first thoughlessly ate too good dinners, which by themselves cost him two and a half thaler per month, and was speedily forced to go back to 18 pfennige dinners every day! Schiller, whose father Joh. Caspar was originally a regimental surgeon, before becoming a civil surgeon in Marbach and subsequently an administrative officer, had, as we know, a monthly pay of 30 marks 60 pfennige, but as a — regimental physician. It may be remarked here incidentally that Schiller, as a physician, was notorious for his heroic treatment as long as he practised. In Austria the "Protochirurg" received a salary of 6000 marks and the "Stabschirurg", 1200 marks (doubled in war); the regimental surgeon, 1200 marks, the "Bataillonschirurg", 480 marks and the "Underchirurg", 366 marks per annum..

In France the surgical inspector received a salary of 4800 marks, the superior surgeon, 1600 marks, and the subordinate surgeon, 300 marks with board. During the period of the Republic these salaries were sometimes more, sometimes less.

Naturally Jews were nowhere admitted as military physicians during the 18th century, not even after the French Revolution until probably a short time ago, because the Council of Vienna in 1267 had forbidden them to practise medicine on Christians. This decree, however, was never observed and executed everywhere, so that e. g. Isaac Friedrich in the year 1388, Salman Pletsch in the year 1394 (his salary was 36 gulden) and Isaac, in the year 1398, were even salaried city-physicians at Frankfort-on-the-Main, and were consulted by Christians. The study of medicine was also forbidden to the Jews in the 16th century, and, accordingly, after the Middle Ages, educated Jewish physicians who practised among Christians were exceptional. This continued unchanged until the French Revolution, which restored to the Jews the citizenship which they had possessed in many places during the Middle Ages. Yet even at the present day they are not endowed with just the same rights in Germany as the Christians, and, as we know, professors of Jewish descent, who (what never before has occurred since the days of Salerno) are once more to be found, and even in considerable numbers, were, and are still, required generally to abandon their religion. Indeed, until late in the 19th century medicine was the only study which was open to the Jews. Actual Jewish city-physicians, provided with a salary, did indeed exist, but state-physicians proper (the successors of the mediaeval city-physicians) of Jewish descent are even to-day very rare, and where they exist are appointed through personal favor or patronage. Here too we may observe a retrograde movement contrasted with the Middle Ages! Not only religious intolerance and a prejudice which has become historical played their part from the beginning in these restrictions, but the ethnological aversion towards representatives of a race originally foreign, an aversion which makes itself felt everywhere, even after long association, must be taken into consideration.

The system of field-hospitals throughout the whole century continued very bad, and was not improved by the Prussian hospital-ordinance of 1787, nor even by the general introduction in 1793 of movable hospitals which had been inaugurated about the close of the 16th century under Henry IV. of France. Larry was particularly active in promoting this system. Barrack-hospitals, proposed by Leibnitz as early as 1714, also existed; at least Pringle erected such hospitals in 1758. But the whole system suffered from the persistence of the double, and strictly distinct, medical and surgical faculties, and it was with the design of destroying this distinction that the Pepinière and Josephinum were organized, to produce army-physicians educated completely in both surgery and medicine.

It should also be mentioned that field-apothecaries existed in many, though not in all, states.

In Saxony the physicians and surgeons had a special uniform, different from that of the soldiers, and the same was the case in other countries. The "Feldmedicus" had a dark blue uniform, collar embroidered in gold, gold facings, gilt sword-belt and hat-cord. The "Stabsfeldscheerer" had in addition a red vest with gilt trimming. His assistants had a red vest without gilt trimmings, a sword without a belt, and a hat without a cord. The hospital field-surgeons had a dark gray coat with red collar (H. Frölich). The gaiters formerly worn by the surgeon gave way to jack-boots. Shaving in the 18th century was frequently discarded. In Saxony, the land of courtesy, towards the end of the century surgeons were required to be addressed as "You", instead of "He" as in preceding times.

How disgraceful, in spite of all improvements, were the social position and the treatment of the army-physician even in the second half of the century may be inferred from the fact that in the year 1758 Dr. Ellenberger of Zinnendorf, the "Feldmedicus", was subjected to corporeal punishment at the command of a colonel, and that a general upon his death-bed could leave orders that fifty blows apiece should be given to the "Tausend-Sackerments-Feldscheerer", in case the post mortem gave results different from those which they had declared to him regarding his disease.

In Austria at the beginning of the Seven Years' War all army surgeons of the Protestant confession were compelled to go over to the Catholic faith or to leave the army. The "Church" did not scorn utterly and entirely even the otherwise despised surgeons.

How deplorable, however, was the situation of the wounded generally after a battle in the last century, and even among the troops of the best managed military states, France and Prussia, may be judged from the facts that the French field-hospitals, and the engagement of their physicians, lay in 1759 in the hands of contractors, who cheated the physicians of their stipulated pay and the wounded of the necessary care, and that in Prussia, after the battle near Torgau (Nov. 3, 1760), the wounded lay all night upon the open fields exposed to robbery. Yet the declaration of the neutrality of hospitals and the medical corps had been frequently made and demanded, e. g. before the battle near Dettingen, an arrangement in which the 18th century anticipated the idea of the Geneva Convention. The king considered it requisite to recommend to the surgeons "not to cut off arms and legs by the dozen". The soldiers wearied by their march too were bled — to remove their fatigue (or its cause) forthwith!

11. MEDICINE IN THE ENGLISH COLONIES OF NORTH AMERICA DURING THE EIGHTEENTH CENTURY.

As the 17th century witnessed the foundation of the American colonies, so the 18th century was the period of their development and growth. Of the colonial settlements which subsequently formed the original thirteen United States, all save Georgia were established during the 17th century.

The entire population of these colonies at the period of the accession of William III. and Mary (1689) is estimated to have been little in excess of 200,000 souls — scarcely that of a mediocre city in these modern days — and the settlements were scattered in a thin and often interrupted line along the Atlantic coast from Maine to South Carolina. By 1714 the population had increased to 376,000 whites and 59,000 negroes; in 1750 it was estimated at 1,040,000 whites and 220,000 negroes, and in 1790 the first census of the United States determined the population at 3,177,257 whites and 752,069 negroes, or a total of nearly four million souls — an increase of nearly 2000 per cent in a single century! It is to be borne in mind too that this enormous growth occurred in spite of the ordinary hardships and perils of colonial life, and in the teeth of a constant succession of bloody and exhausting wars. In the 71 years intervening between 1689 and 1760 the colonies had passed through no less than four severe contests, whose united duration amounted to 27 years.

The confusion of social relations occasioned by the introduction into the colonies of such a mass of new vitality gathered from all the nations of western Europe, and the burdens, dangers and anxieties of a protracted warfare, would seem to offer few conditions favorable to the cultivation of the sciences. Yet amid these apparently hostile surroundings there were present likewise some conditions which fostered the development of medical science at least. Foremost among these we may mention the introduction into the colonies of numerous educated medical men, who served as army-surgeons with the British forces in America, and whose precepts and example could not fail to excite interest and emulation in their colonial colleagues. Then too war itself proved on this occasion, as so often before and since, the best school of medicine and surgery. Among the numerous immigrants who came to these shores there was (besides many pretenders and charlatans) a considerable number of respectable and well-educated physicians of the Old World, who hoped to enjoy a more lucrative business, or increased liberty of conscience in the New-

These brought with them into their new homes the latest medical theories and the improved practice of their day, to be disseminated, consciously or unconsciously, among their colonial neighbors and colleagues. The constantly increasing commercial intercourse between the Old World and the New, and the growing wealth of the colonists, also enabled a larger number of young men to acquire their medical education in Europe. From all these causes it is apparent that the standard of medical ability would naturally be gradually elevated in the colonies, and such was the fact throughout the entire 18th century. It was not, however, until the foundation of the medical schools of Philadelphia and New York about the middle of the century that this improvement became very manifest, and these schools were both an evidence, and the cause, of the improved spirit of the medical profession during the latter half of the century.

The stagnant waters of colonial medical life were stirred, however, during the first half of the 18th century by the controversy over the subject of the inoculation of small-pox, a controversy which sheds considerable light upon the medical relations of that period. In the preceding pages we have had abundant opportunities to observe the generally pernicious influence of the clergy on medicine, and it is with a feeling akin to refreshment that we record here the fact that the introduction of the practice of inoculation for small-pox was largely due to the suggestion and advocacy of the clerical profession. In the year 1721 the Rev. Cotton Mather of Boston, whose name has already attained an unenviable notoriety in this history in connexion with the "Salem witchcraft", having read in the Transactions of the Royal Society of London the communications of Dr. Timoni and Pilarini relating to the practice of inoculation in Turkey, called the attention of several of his medical acquaintances to this subject. None of them, however, paid any considerable attention to the matter except Dr. Zabdiel Boylston, whose name accordingly deserves the most prominent position among the physicians of the first half of the 18th century. Dr. Boylston, the son of Dr. Thos. Boylston of Brookline, Massachusetts, was born in Massachusetts in 1680 and educated under the direction of his father (an M. D. of Oxford) and Dr. John Cutter, an eminent physician and surgeon of Boston. Settling in the latter city Dr. Zabdiel Boylston soon acquired both fame and fortune in the practice of his profession, while his interest in botany and natural history led him into correspondence with Sir Hans Sloane and other members of the Royal Society. He was much impressed by the facts related in the communications of Timoni and Pilarini, and determined to put the question of inoculation to immediate proof. Accordingly on June 27th, 1721, he inoculated with the virus of natural small-pox his own son, aged 13 years, and two negro servants in his family. All these cases proved entirely successful, and, encouraged by this success, Dr. Boylston within the next twelve months inoculated in Boston and its vicinity 247 persons of both sexes and of all ages. During the same period 39 persons were also inoculated by other physicians, and of the whole 286 patients thus treated six (about 2 per cent.) died, while of 5759 persons who took the disease in the natural way 844 died, a mortality of over 14 per cent. In spite of this demonstration of the advantages of inoculation the operation was violently opposed, not only by the populace, but even more strongly by the majority of the medical profession, while, singularly enough, its warmest advocates and defenders were found within the ranks of the clergy. The press too assailed the new operation, and Benjamin Franklin, then a youth of sixteen employed in the office of his brother, opposed it in the columns of his brother's newspaper "The New England Courant". It should, however, be said to the honor of the future philosopher that he subsequently admitted the incorrectness of his youthful opinions. Dr. Boylston was threatened with hanging by the populace, and on one occasion was compelled to secrete himself for two weeks in a private place in his house in order to escape the search of an infuriated mob, excited by the slanders of the newspapers and his medical colleagues. Undismayed, however, by these persecutions Dr. Boylston persevered in his course, and finally enjoyed the satisfaction of seeing the advantages of his system generally recognized. In 1723, on the invitation of Sir Hans Sloane, he visited England, was made a member of the Royal Society and enjoyed the acquaintance of the royal family and the most distinguished persons of the period. Three years later, on the request of the Royal Society, he also published an account of his practice of inoculation in America, which he dedicated to the princess Caroline. Dr. Boylston died in 1766.

At the head of the medical opponents of inoculation in Boston was Dr. William Douglass, a Scotchman and an alumnus of Leyden and Paris, who had settled in Boston in 1718. A man of no mean ability, but endowed with the obstinacy and the conceit of his nation, Dr. Douglass has been wittily described as one who was "always positive and sometimes accurate". He was well versed in astronomy and the natural sciences, and in 1743–44 published an almanac[1] entitled "Mercurius Novanglicanus, by William Nadir S.X.Q." Dr. Douglass opposed the practice of inoculation with all his Scotch energy and perseverance, though it is said that he too lived long enough (he died in 1752) to modify his views upon this subject. His publications relating to inoculation were entitled "The Inoculation of the Smallpox as practised in Boston, 1722"; "The Abuses and Scandals of some late Pamphlets in favor of Inoculation, 1722"; "A practical Essay concerning the Smallpox, containing the History" etc., 1730. He also published a "Practical History of a New Eruptive Miliary Fever, with Angina Ulcusculosa", which prevailed in Boston in 1735–36, and an historical work entitled "The British Settlements in North America", in two volumes. The latter work is said to be a curious compound of personal reminiscences and quarrels, together with a summary of public affairs displaying little judgment and discretion, and containing many inaccuracies Other opponents of inoculation in Boston were Dr. Lawrence Dalhonde, a popular French physician, who published a curious deposition in opposition to the operation, and Dr. Joseph Marion, who with Dr. Douglass testified to the accuracy of the translation of this deposition. In spite of all opposition, however, the practice of inoculation soon spread throughout New England, and in a few years reached New York, Philadelphia, Baltimore and even Charleston. Public hospitals for inoculation were established in 1764 at Point Shirly by Dr. William Barnet, and in the same year at Castle William in Boston harbor by Dr. Samuel Gelston of Nantucket. Dr. Isaac Rand Sr. (died 1749), Dr. William Aspinwall (1743–1823), who had a private hospital for inoculation, Dr. Lemuel Hayward (died 1821), Dr. Henry Stevenson of Baltimore, Dr. John Ely of Connecticut and Dr. Benjamin Gale (1715–1790), also of Connecticut, were eminent as inoculators during the 18th century. The operation was introduced into South Carolina as early as 1738 by Drs. Maubray (a surgeon in the British navy) and Kirkpatrick. In 1750 Dr. Adam Thomson (died 1768) of Maryland published "A Discourse on the Preparation of the Body for Smallpox", Philadelphia, in which he advocated the preparative employment of mercury and antimony before the performance of inoculation, a method which he had made use of since 1738. Though Dr. Thomson's method at first met with considerable opposition, it was speedily adopted in many parts of the country, e. g. by Dr. Barnet of Boston, Dr. Gale of Connecticut etc., and was also highly commended in England by Huxham, Woodward and others. Eventually it came to be known as the "American method", and is usually ascribed to Dr. Gale, who gave a full description of the method in the Transactions of the Philosophical Society for 1765. Dr. Gale himself, however, referred the method to Dr. Thompson "of Pennsylvania or Maryland" and Dr. Morison of Long Island. — Hospitals for inoculation were usually established in secluded places in the neighborhood of cities, and occasionally produced so much alarm as to influence commerce injuriously. This was so much the case in 1747 in the city of New York that Gov. Clinton issued a proclamation "strictly prohibiting and forbidding all and every of the Doctors, Physicians, Surgeons and Practitioners of Physick, and all and every other person within this province, to inoculate for the small-pox any person or persons within the City and County of New York, on pain of being prosecuted to the utmost rigor of the law."

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[1] Dr. Nathaniel Ames (1708–1764), a practitioner of Dedham, Mass., also published an almanac annually from 1735 to 1764.

Among the more eminent physicians of the first half of the 18th century we may mention Dr. John Mitchell, F. R. S., an Englishman who settled in Virginia about 1700 and was distinguished as a botanist as well as a physician. Besides numerous communications to the Royal Society, Dr. Mitchell published a work on botany (1769), and in 1743 wrote an

"Essay on the Causes of the Different Colors of People of Different Climates", published in the Philosophical Transactions. His most important production, however, was a paper on yellow fever as it appeared in Virginia in 1737, 1741 and 1742, the manuscript of which fell subsequently into the hands of Dr. Rush, who, as he himself confesses, derived from it many valuable ideas. Another eminent botanist and physician of Virginia was Dr. John Clayton (1685–1773), a native of England, who came to Virginia in 1705. His "Flora Virginica" was published at Leyden by Gronovius in 1739, 1743 and 1762. Dr. Cadwallader Colden (1688–1776), a native of Scotland and an alumnus of Edinburgh, is perhaps better known as a naturalist and a statesman than as a physician. He came to Philadelphia in 1708 but removed in 1718 to New York, where he held the office of Lieut. Governor from 1761 to 1775. His interest in medicine was manifested by a paper on the "Sore-throat Distemper" (1735), and others on cancer and "On the Virtues of the Great Water Dock". He also published in 1743 some "Observations on the Yellow Fever of New York, 1741–42". Dr. Colden was also an eminent botanist and natural philosopher, maintaining a correspondence for many years with Linnæus, Gronovius of Leyden, and the more eminent physicians and naturalists of his own day, both in Europe and his adopted country. With Dr. Franklin particularly he carried on a long and intimate correspondence, and it is said in one of Dr. Franklin's letters that the idea of the American Philosophical Society (established in 1743) was suggested by Dr. Colden. Dr. Thomas Cadwallader, a native of Philadelphia, but a pupil of Cheselden, was the first physician in Philadelphia to perform dissection (1752), and an assistant of Dr. Shippen in his anatomical lectures. He was also one of the earliest contributors to American medical literature by his "Essay on the Iliac Passion", published in 1740. In this essay he recommends in the treatment of the disease under discussion mild cathartics and opium, instead of the mercury and drastics heretofore commonly employed. We owe likewise to his pen an essay whose title-page bears the following words: "An Essay on the West India Dry Gripes, with the method of preventing and curing that Cruel Distemper. To which is added an extraordinary case in Physick. Printed and Sold by B. Franklin, Philadelphia, MDCCXLV." Dr. Cadwallader was also one of the first physicians appointed to the Pennsylvania Hospital in 1751. He died Nov. 14, 1779. Dr. John Bard (1716–1799), a native of Burlington, N. J., was educated under Mr. Kearsly, an English surgeon of Philadelphia. Dr. Bard himself began his practice in Philadelphia, but in 1746 removed to New York, where he soon acquired great popularity and eminence. In 1749 he addressed to "a weekly society of gentlemen in New York" an essay on the nature and causes of the malignant pleurisy which had prevailed on Long Island. He likewise published in the "London Medical Observations and Inquiries" a case of extra-uterine fœtation treated by gastrotomy in 1759 (the first case recorded in this country), and the "Medical and

Philosophical Register", edited by Drs. Hosack and Francis, contains several papers from his pen on the nature and character of yellow fever. In 1750 Dr. Bard, in conjunction with Dr. Peter Middleton (died 1781), injected and dissected before a class of students the body of a criminal, which had been delivered to them for educational purposes. Dr. Bard was also the first president of the Medical Society of New York on its organization in 1788. We should also notice among the early American medical writers Rev. Jonathan Dickinson of Elizabethtown, N. J., a clergyman who, after the custom of the early colonial clergy, also practised medicine, and who published in 1740 in pamphlet form some "Observations on that Terrible Disease vulgarly called The Throat Distemper"; Dr. John Walton, who is said by Thacher to have published in Boston in 1732 an essay on fevers; Dr. John Lining, a native of Scotland who emigrated to South Carolina in 1730, instituted some physiological experiments after the method of Sanctorius, and published them in the Transactions of the Royal Society for 1743, and ten years later published "A Description of the American Yellow Fever" in the form of a letter to Dr. Robert Whytt of Edinburgh; Dr. John Tennent of Virginia published in 1736 the first account of the polygala senega and its use in pulmonary complaints.

The interest of the colonists in educational matters had been already shown in the preceding century by the establishment of Harvard College in Massachusetts and William and Mary College in Virginia. During the 18th century numerous colleges and so-called "universities" were founded in the different colonies. The most important of these were Yale College, founded in 1701, the College of New Jersey (Princeton), founded in 1746, the University of Pennsylvania, 1749, King's College (now Columbia), N. Y., 1754, Rhode Island College (Brown University), 1764, Dartmouth College, 1769, Queen's College (Rutger's), N. J., 1770, Dickinson College, Penn., 1783, Union College 1795, the University of North Carolina, 1795 etc. In none of these institutions, however, was any medical instruction imparted during the first half of the 18th century. During this period the vast majority of colonial practitioners of medicine were compelled to satisfy themselves with such education as could be acquired in the offices of the more or less eminent physicians or surgeons of their vicinity. The system of apprenticeship for three to seven years was still in vogue throughout the entire 18th century. Thacher says of Dr. John Bard:

"He received the rudiments of a polite and classical education at Philadelphia, and at the age of 14 or 15 years was, according to the custom of that day, bound apprentice to Mr. Kearsly, an English surgeon of good talents, but of so unhappy a temper that his presence banished cheerfulness from his family. He treated his pupils with great rigor and subjected them to the most menial employments, to which Dr. Bard has been heard to say he would never have submitted but from the apprehension of giving pain to his excellent mother, who was then a widow with seven children and a very moderate income, and from the encouragement he received from the kindness of her particular friend, Mrs. Kearsly, of whom he always spoke in terms of the warmest gratitude, affection and respect." This was about 1730-37.

An indenture of the year 1760 (quoted by Wickes) contains the following provisions, which shed much light upon the relations of the period:

"During all which term" (four years and eight months) "the said Apprentice his said Master well and faithfully shall serve, his secrets keep, his lawful commands every where obey. He shall do no damage to his said Master, nor see it to be done by others without letting or giving notice to his said Master. He shall not contract matrimony within the said term. At cards, dice or any other unlawful game he shall not play, whereby his said Master may have Damage. He shall not absent himself day or night from his said Master's Service without his leave, nor hant Ale houses, Taverns or play houses, but in all things as a faithful Apprentice he shall behave himself towards his said Master all his during his said term. And the Said Master during the S'd term shall by the best of his Means or Methods Arts and Mysterys of a Physician and Surgeon as he now professes Teach or cause the said Apprentice to be Taught to perfection in consideration of the sum of One hundred Pounds Lawful money of New York to him in hand paid by the said James Hubbard (in four payments); that is to say Thirty Pounds in hand down, and the remainder in Four Equal payments, One each year till the whole is paid. And the said William Clark Acknowledges himself therewith contented and the receipt thereof. And the said Master is to provide his said Apprentice with sufficient Meat, Drink, Washing and Lodging and Mending his said clothes within the Said term. And the said James Hubbard is to find him in wearing apparel during said term aforesaid. At the end of Said term the Said Master shall and will give unto the said Apprentice a new set of surgeon's pocket instruments — Solomans Dispensatory,[1] Quences Dispensatory and Fuller on Fevers, and for the true performance of all and every of the said covenants" etc.

At the expiration of the period of apprenticeship it was customary to furnish the embryonic doctor with a certificate, of which the following, also from Wickes, furnishes an example:

"Philadelphia. This is to certify all whom it may concern that Mr. Saml. Treat hath served as an Apprentice to me for nearly four years, during which time he was constantly employed in the practice of Physic and Surgery under my care, not only in my private business, but in the Pennsylvania Hospital, in which character he always behaved with great Fidelity and Industry. In Testimony of which I have hereunto set my hand this first day of September One thousand Seven hundred and Sixty-five. Signed John Redman."

During the first half of the 18th century no preliminary education on the part of the apprentice was demanded, but on the foundation of the

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1. Probably the "New London Dispensatory" of William Salmon, London, 1678. Wickes says "We have seen a copy of Salmon's Herbal, published in 1696, which was the text-book of a New Jersey physician of large practice and, in his day, of much reputation. Being a man of property he paid the expenses of a messenger to England to obtain the volume. It is a folio of 1300 pages; cost £50." Quences Dispensatory is probably the "Dispensatory of the Royal College of Physicians in London", published by Dr. John Quincy, London, 1721-22. Thomas Fuller, a physician of Kent in England, published in 1730 a treatise entitled "Exanthematologia; or an attempt to give a rational account of eruptive fevers, especially the measles and smallpox, with an appendix concerning inoculation", London.

New Jersey Medical Society in 1766 it was ordered that: "hereafter no student be taken an apprentice by any member (of the Society) unless he has a competent knowledge of Latin and some initiation in the Greek." Also that "no member hereafter take an apprentice for less than four years, of which three shall be with his master, and the other may, with his master's consent, be spent in some school of physic in Europe or America." The fee for instruction was fixed at £100 per annum, Proclamation money.

That even this imperfect system of medical education was capable of producing very competent practitioners may be inferred form the example of Drs. Zabdiel Boylston, John Bard and numerous other colonial physicians, whose circumstances did not permit them to gain their education in Europe.

Special courses of lectures upon certain branches of medicine seem to have been delivered occasionally by more or less eminent physicians before the establishment of any medical schools proper. The anatomical lectures of Dr. Giles Firman of Boston in 1647 have been already mentioned. The dissection and instruction of Drs. John Bard and Peter Middleton of New York in 1750, and the anatomical lectures of Dr. Thomas Cadwallader of Philadelphia about the same period have also received notice above. A course of instruction in osteology and myology by Thomas Wood, a surgeon of New Brunswick, was also advertised in the New York Weekly Post Boy for January 27, 1752. This advertisement closes as follows:

> N. B. If proper Encouragement is given in this Course, he (Dr. Wood) proposes soon after to go thro' a Course of Angiology and Neurology; and conclude with performing all the Operations in Surgery on a Dead Body. The use of which will appear to every Person who considers the Necessity of having (at least) SEEN them performed before he presumes to perform them himself on any living Fellow Creature." The fee for this course was to be six pounds, Proclamation money.

A course of lectures on anatomy, the history of anatomy and comparative anatomy was delivered at Newport, Rhode Island, by Dr. William Hunter (1729–1777) in the years 1754–5–6. Dr. Hunter was a near relative of the famous brothers William and John Hunter, and a pupil of the elder Monro of Edinburgh. He was a Scotchman by birth and immigrated to Rhode Island in 1752, where he acquired great reputation as a surgeon and married into one of the most opulent families of that colony.

None of these essays, however, resulted in any permanent advancement of medical education in the colonies. A more prosperous event awaited the efforts of Drs. Shippen and Morgan of Philadelphia. Dr. William Shippen Jr. (1736–1808), a native of Philadelphia, was educated at the College of New Jersey and began his medical studies under the direction of his father Dr. Wm. Shippen Sr. At the age of twenty-one years he went to London and lived for a season in the family of Mr. John Hunter, spending much of his time also in the anatomical theater of Dr. Wm. Hunter. He likewise devoted much attention to the subject of obstetrics under the direction of Dr. Hunter and Dr. McKenzie, a celebrated obstetrician of London. Graduating in 1761 at the university of Edinburgh, where he had been a student of Cullen and the elder Monro, he returned in 1762 to America, and began preparations at once to introduce public instruction in practical anatomy and midwifery into this country. His first course of lectures was delivered in the same year, and was attended by a class of twelve students. Similar private courses were delivered by Dr. Shippen in 1763 and 1764, but in 1765 a medical department of the College of Philadelphia (founded in 1749) was organized, and in this department he received the appointment of professor of anatomy and surgery. Dr. Shippen's anatomical lectures were continued regularly until the winter of 1775, when they were interrupted by the war of the Revolution. During this time the annual number of students had increased to between thirty and forty. In July 1776 Dr. Shippen was appointed chief physician to the flying camp of the Continental army, and in 1777 was unanimously elected by the Provincial Congress Director General of all the army-hospitals. In 1780 he was again chosen Director General of the Army-Medical-Department, but this position he resigned in 1781 in order to devote his entire attention to the medical school in Philadelphia. Even during the war Dr. Shippen's anatomical lectures had been suspended only during the winters of 1776 and 1777, as subsequently he returned to the city every winter and delivered the usual course, shortened somewhat by the exigencies of the occasion. Dr. Shippen was also the first public teacher of midwifery in this country, and contributed probably more than any other single individual to the popularizing of male midwifery. The loss of a favorite and only son in 1798 so changed the entire current of Dr. Shippen's thoughts that, subsequent to this sad event, he never recovered his previous interest and activity in medical matters, though even as late as 1807 he delivered the introductory address to the course of lectures before the medical class of the University of Pennsylvania — increased now probably to the number of nearly 400.

Dr. John Morgan, F. R. S. (1735–1789) was likewise a native of Philadelphia, and in 1757 received the first literary honors conferred by the College of Philadelphia. He began his medical studies under Dr. John Redman, and having completed his apprenticeship entered the provincial army as a lieutenant and surgeon in the last of the wars against the French. In 1760 he left the army and sailing to Europe attended the lectures and dissections of Dr. William Hunter, and subsequently spent two years at Edinburgh under the teaching of the Monros, Cullen, Rutherford, Whytt and Hope. Graduating at Edinburgh in 1762, Dr. Morgan made an extended tour of the continent in the further prosecution of his medical studies, and upon his return to London was elected a Fellow of the Royal Society and was admitted a Licentiate of the College of Physicians of London and a member of the College of Physicians of Edinburgh. In 1765 he returned to Philadelphia, and it was largely through his personal influence that the medical department of the College of Philadelphia was organized in the same year, he himself receiving the professorship of theory and practice. In 1775 Dr. Morgan was appointed by Congress "Director General and Physician-in-Chief of the hospital in the American army", in place of Dr. Church, but in 1777 was unjustly dismissed from the service on charges, the truthfulness of which was fully disproved by an investigation subsequently inaugurated at his own request.

Drs. Shippen and Morgan were originally the sole professors of the medical faculty of the College of Philadelphia. In 1768, however, Dr. Adam Kuhn, a pupil of Linnæus, was appointed professor of materia medica and botany, and Dr. Benjamin Rush in 1769 received the appointment of professor of chemistry. Dr. Thomas Bond in the latter year was likewise appointed to give clinical lectures in the Pennsylvania Hospital. Such was the organization of the first medical college founded in the United States. The first medical commencement of this institution occurred June 21, 1768, on which occasion the degree of M. B. was conferred upon ten candidates. The charter of the College of Philadelphia was abrogated for political reasons in 1779, and the University of Pennsylvania organized. In 1789 the charter of the former institution was restored, though without interfering in any respect with the privileges of the University, and in 1791 the two schools were united. Since this period the medical department of the University of Pennsylvania has been one of the most eminent medical schools of our land.

In 1767 the medical department of King's College, New York, was organized with the following very complete faculty: Samuel Clossey, professor of anatomy; Peter Middleton, prof. of the theory of physic; John Jones, prof. of surgery; James Smith, professor of chemistry and materia medica; John V. B. Tennent, prof. of midwifery, and Samuel Bard professor of the practice of physic.

Dr. Clossey was an Irish physician who had attained some reputation before his arrival in this country by a pathological work entitled "Observations on some of the Diseases of the Human Body, chiefly taken from Dissections of Morbid Bodies" (London, 1763). On the outbreak of the Revolution he returned to his native land, where he soon after died.

Peter Middleton, a native of Scotland, was equally distinguished for his profound learning and his professional talents. We have already noticed his injection and dissection of a human body in 1750, in conjunction with Dr. John Bard. Dr. Middleton also published in 1769 a "Medical Discourse, or Historical Inquiries into the ancient and present state of medicine." He died of cancer of the pylorus at New York in the Year 1781.

James Smith (died 1812) was a brother of the historian William Smith, an alumnus of Leyden, and more eminent as a theorist than as a practitioner.

John V. B Tennent was a native New Jersey, an alumnus of Princeton College and the University of Edinburgh, and a Fellow of the Royal Society. He died at an early age in the West Indies, whither he had gone to recover his health

Samuel Bard was one of the most eminent physicians of the 18th century. The son of Dr. John Bard, who has been already mentioned, he was born in Philadelphia in 1742 and received his preliminary education in King's College, New York. In 1761 he repaired to London and placed himself under the instruction of Dr. Alexander Russell, but in the following year removed to Edinburgh, where he enjoyed the teaching of Cullen, the Monros, Ferguson, Rutherford, Whytt, Hope, Gregory etc. On May 13, 1765, Dr. Bard received his medical diploma from the university of Edinburgh, having presented a thesis entitled "De viribus Opii", which elicited numerous encomiums. In the following year Dr. Bard returned to his native land and was appointed professor in the medical department of King's College, as above mentioned. The foundation of the New York Hospital was largely due to his suggestion, and he continued one of its visiting physicians until his retirement in 1798. He was likewise one of the founders of the New York Dispensary. On the reorganization of the Medical Faculty of Columbia College in 1791, he was made its Dean, and in 1813 became the president of the College of Physicians and Surgeons. Besides numerous introductory and other addresses, Dr. Bard published in 1771 a paper on "Angina Suffocativa", another on uterine hæmorrhage in 1788 and a work on obstetrics (Compendium of the Theory and Practice of Midwifery) in 1807. He died May 24, 1821.

Lectures in the medical department of King's College began on the first Monday of November, 1767, and the degree of M. B. was conferred upon Mr. Robert Tucker and Samuel Kissam — the first-fruits of the now famous College of Physicians and Surgeons — Tuesday, May 16, 1769. The first regular[1] degree of M. D. in the United States was conferred upon Samuel Kissam in March 1770 by King's College, which anticipated in this matter the College of Philadelphia by a single year. During the war of the Revolution all instruction in King's College was discontinued, and the buildings were occupied for hospital purposes. In 1787 the name of the institution was changed to Columbia College, but it was not until 1792 that the faculty was completely reorganized, and between this period and 1800 it is said that the number of medical degrees conferred was only fifteen. The success of the medical department of Columbia College was, however, far from satisfactory, and in 1807 the Board of Regents deemed it wise to charter the present College of Physicians and Surgeons of New York. Internal feuds and medical rivalries combined to cripple the efforts of both institutions, and in 1813 the two medical schools were united under the presidency of the venerable Samuel Bard, the title of College of Physicians and Surgeons being retained, and the medical department of Columbia College discontinued. In 1860 the connexion with Columbia College was again restored by the designation of the College of Physicians and Surgeons as the Medical Department of Columbia College.

The medical department of Harvard University was founded in 1783, mainly through the efforts of Dr. John Warren, who became the first professor of anatomy and surgery. With him were associated Dr. Benjamin Waterhouse as professor of Theory and Practice, and Aaron Dexter as professor of Chemistry. The lectures were delivered in Cambridge until the erection of the Massachusett's Medical College in Mason Street, Boston, 1815.

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[1] "In 1663 Capt. John Cranston was licensed by the general court 'to administer physicke and practice chirurgerie', and had conferred upon him the degree of M. D. in the following words: 'And is by this court styled doctor of physick and chirurgery by the authority of this the general assembly of this colony' (Rhode Island)", and the honorary degree of M. D. was conferred upon Daniel Turner by Yale College in 1720. As Dr. Turner had been a liberal benefactor of the College the M. D. was facetiously said to signify *multum donavit*. (Toner.)

Dr. John Warren was born in Roxbury, Mass., July 27, 1753, graduated at Harvard College in 1771, and studied medicine with his brother the eminent patriot Dr. Joseph Warren (1741-1775), who was slain at the battle of Bunker Hill. Dr. John Warren attended the wounded in this battle, and during the Revolutionary War became superintending surgeon of the military hospitals in Boston. In 1780 he delivered lectures on anatomy to his students and the physicians of his acquaintance in Boston, and in 1783 was appointed professor of anatomy and surgery in the newly established Medical School at Cambridge. He was President of the Massachusetts Medical Society from 1804 until his death, and one of the most eminent surgeons of New England. He died in Boston, April 4, 1815.

Dr. Waterhouse (1754-1846) was a native of Newport, R. I., studied in London and Edinburgh and graduated at Leyden in 1780. In addition to his professorship in Harvard College, he was also professor of natural history in Brown University, Providence, and the first lecturer on this subject in any American college. He is best known, however, as the introducer of the practice of vaccination into the United States in 1800. His "Lectures on the Theory and Practice of Medicine" appeared in 1786.

Dr. Dexter (1750-1829) was an alumnus of Harvard and a pupil in medicine of Dr. Samuel Danforth of Boston.

In 1787 Dr. Nicholas Romayne established a very successful private medical school in New York, which of course conferred no degrees. In 1791, however, having associated with himself other teachers, Dr. Romayne applied to the Regents of the University of New York for authority to confer degrees. On the denial of this request he applied to Queen's College (now Rutgers), New Jersey, for similar authority, and in 1793 received the desired power. This arrangement continued until 1816, when it was terminated by an act of the Legislature of New York. Subsequently medical degrees were conferred upon the students of this school by the Faculty of Geneva College in Western New York, but this arrangement was likewise soon terminated, and the school ceased to exist.

Dr. Romayne (1756-1817) was a native of New York and an alumnus of the University of Edinburgh. He also visited the continent and spent two years in Paris. Returning to his native country about 1782, in the following year he was appointed one of the Trustees of the reorganized Columbia College, but soon after resigned this position in disgust and opened a private school of medicine, in which he taught anatomy, practice, chemistry and botany with eminent success. In 1806 he was elected the first President of the Medical Society of the City and County of New York, and in the following year President also of the College of Physicians and Surgeons, positions which he filled with great ability and acceptability. A man of great pride and possessed of the utmost confidence in his own opinions, Dr. Romayne, though enjoying the reputation of extraordinary ability, was for a considerable period somewhat under the ban of the medical profession in New York, though his last days were highly honored.

The Medical School of Dartmouth College was established in 1798 by the energy and enterprise of Dr. Nathan Smith, who for twelve years constituted its entire Faculty, except that during two courses of lectures he was assisted by a lecturer on chemistry.

Nathan Smith (1762–1829) was a native of Rehoboth, Mass. and an alumnus in medicine of Harvard College. He likewise studied in England and Scotland. Besides his multitudinous duties at Dartmouth College, he also lectured in the University of Vermont and Bowdoin College, and in 1813 was appointed professor in the new medical school of Yale College. It is, accordingly, unnecessary to say that he was a man of extraordinary energy and versatility of genius, representing what our Dr. Holmes would call a whole "settee" of professorships.

Most of these medical institutions were modelled after the University of Edinburgh, of which many of the colonial professors were alumni. Their general regulations relative to admission, examination, graduation etc. may be inferred from the following notice published by the Medical Department of King's College, N. Y., in 1767 :

"Degrees in Physic will be conferred upon the following Terms:

1. Each Student shall be matriculated as in the Universities of England.
2. Such Students as have not taken a Degree in Arts shall satisfy the Examiners before their admission to a degree in Physic, that they have a competent knowledge of at least the Latin Language, and of the necessary Branches of Natural Philosophy.
3. No Student shall be admitted to his Examination for a Bachelor's Degree in less than three Years after his Matriculation; and having attended at least one complete Course of Lectures under each Professor: Unless he can produce proper Certificates of his having served an Apprenticeship of three Years to some reputable Practitioner; in which Case he may be admitted to his Examination in Two Years from his Matriculation.
4. In one Year after having obtained a Bachelor's Degree a Student may be admitted to his Examination for the Degree of Doctor; provided he shall previously have attended two Courses of Lectures under each Professor, be of Twenty-two Years of Age and have published and publickly defended a Treatise upon some Medical Subject.
5. The Mode of Examination, both public and private, shall be conformable to the Practice of the most celebrated Universities of Europe.
6. Students from any reputable University may be admitted *ad eundem*, producing proper Certificates, and Graduates will be entitled to the same privilege on producing the like Certificate and satisfying the Professors of their Medical Abilities."

The Course of Lectures began usually in September and closed in the following May or June. Dr. Shippen's anatomical course consisted of sixty lectures. In 1769 the fee for the anatomical course of Dr. Clossy was £5; for private pupils £10, and for the course of materia medica £3 5s. An introductory lecture was regularly delivered at the opening of the course as at the present day. The expense of the degree of M. B. to the student amounted to about $60 in our present currency. Since 1812 no degree except M. D. has been conferred by our American colleges. Dr. Billings estimates the total number of graduates of our medical colleges between 1769 and 1800 at 221.

The earliest medical library established in this country was that of the Pennsylvania Hospital, founded in 1762, and now containing about 13,000 volumes. Many of these volumes were selected specially for this library by Dr. Lettsom of London and Louis in Paris. The library of the New York Hospital, now containing about 10.000 volumes, was begun in the year 1776, and the library of the College of Physicians of Philadelphia in 1788. According to Bartlett, the libraries of American physicians about 1776 consisted of the works of Boerhaave with the commentaries of Van Swieten; the Physiology of Haller; the Anatomy of Cowper, Keil, Douglass, Cheselden, Monro and Winslow; the Surgery of Heister, Sharp, Le Dran and Pott; the Midwifery of Smellie; the Materia Medica of Lewis and the works of Sydenham, Whytt, Mead, Brookes and Huxham. The works of Cullen were just becoming known (Billings).

Medical societies for mutual improvement and protection seem to have been introduced into the colonies at an early period. In 1736 Dr. Douglass addresses his paper on "The Throat Distemper" to "a Medical Society of Boston": Dr. John Bard's essay upon "The malignant Pleurisy" in 1749 was drawn up at the request of "a weekly Society of Gentlemen in New York, and addressed to them at one of their meetings", and the introductory lecture of Dr. Middleton to the course of lectures in the medical department of King's College in 1769 speaks of a medical society "now subsisting". This latter society seems to have dissolved in 1794, or rather to have merged itself into a new association styling itself The Medical Society of the State of New York — not to be confounded, however, with the Society of the same name authorized by the Legislature in 1806 and organized in 1807. The former society in 1806 was again merged into the present Medical Society of the County of New York. The following medical societies and associations were also organized during the 18th century:

New Jersey State Medical Society	1766
Massachusetts Medical Society	1781
College of Physicians of Philadelphia	1787
Medical and Chirurgical Faculty of Maryland (1789), incorp.	1799
Medical Society of Delaware	1789
Medical Society of South Carolina	1789
New Hampshire Medical Society	1791
Connecticut State Medical Society	1792.

The earlier State medical societies, e. g. those of New Jersey, Massachusetts, Delaware etc., were authorized to license candidates for the practice of medicine, and to examine the candidates as a preliminary to such license; hence they were important agents in determining the standard of medical education in the colonies.

Pest-houses were established in the vicinity of the larger cities from time to time, as the prevalence of epidemic diseases demanded.

The first general hospital chartered in the colonies was, however, the Pennsylvania Hospital of Philadelphia, organized in 1751 with a medical staff of six physicians and surgeons, viz. Drs. Lloyd Zachary, Thomas Bond, Phineas Bond, Thomas Cadwallader, Samuel Preston Moore and John Redman. Patients were received into a temporary building in 1752, and the permanent hospital building was opened for their reception in December 1756. — It was within the walls of this hospital that the first clinical instruction in America was given by Dr. Thomas Bond.

The establishment of the New York Hospital was largely due to the influence of Dr. Samuel Bard, who in 1769, at the first commencement of the Medical Department of King's College, directed attention in his public address to the necessity of such an institution. Upon the same day Sir Henry Moore, Governor of the province of New York, started a subscription for the establishment of a suitable hospital in New York City, and the sum of £800 was soon pledged for this object. The corporation of the City of New York added to this amount the sum of £300 and the corner stone of the hospital was laid July 27, 1773. The building was unfortunately destroyed by fire on Feb. 28, 1775, before it was quite ready for occupation, and in consequence of the war was not rebuilt and put into a condition to receive patients until January 3, 1791.

The Philadelphia Dispensary for the gratuitous treatment of the sick poor, the first institution of its kind in the United States, was founded in 1786, and was soon followed by the New York Dispensary organized Jan. 4, 1791 and incorporated in 1795.

The earliest institution for the special care of the insane was the Eastern Lunatic Asylum at Williamsburgh, Virginia, chartered in 1772, and opened for the reception of patients in 1773. Its first physician was Dr. John Minson Galt of Williamsburgh. — It should, however, be remarked that the charter of the Pennsylvania Hospital, granted in 1751, also provided for the care of lunatics, though the institution was not specially designed for their treatment and protection.

In pathology America has always followed the lead of the Old World, and the medical systems of Europe have been ever reflected in American practice. Accordingly the earliest educated medical practitioners of this country followed in general the views of Sydenham. With the opening of the 18th century, however, the influence of Boerhaave and his teachings was strongly felt in the colonies, and in 1760 Rush declared that "the system of Boerhaave governed the practice of every physician in Philadelphia." To the system of Boerhaave succeeded that of Cullen, who had been the teacher of many of the early professors in our medical schools, and the doctrines of Cullen were generally accepted in this country until the close of the century and even later. In the last decennium of the century the famous Benjamin Rush, who exercised a more conspicuous influence upon the theory and practice of medicine in the United States than any of his predecessors at least, taught and practised a modified Brunonianism, to which he professed to have been led by his experience with the epidemic of yellow fever in Philadelphia in 1793.

Dr. Rush was born near Philadelphia Dec. 24, 1745 and received his early education in Nottingham, Maryland. He entered Princeton College in 1759 and received his degree of A. B. in the following year. For the next six years he pursued the study of medicine in the office of Dr. John Redman of Philadelphia, and formed one of the members of Dr. Shippen's first class in anatomy. On the expiration of his apprenticeship, Dr. Rush went to Edinburgh and received here the degree of M. D. in 1768, on which occasion he presented a thesis entitled "De Coctione Ciborum in Ventriculo". Having visited the hospitals of London and Paris, he returned in 1796 to Philadelphia, and was immediately appointed professor of chemistry in the newly organized medical department of the College of Philadelphia. In 1776 Dr. Rush was a member of the Continental Congress and one of the Signers of the Declaration of Independence.[1] In 1777 he was appointed by Congress Surgeon-General of the hospital in the Middle Department, and in 1787 he was again a member of the Convention for the adoption of the Constitution of the United States. He died in Philadelphia April 19, 1813.

Dr. Rush was a voluminous and indefatigable writer on a very great variety of subjects, medical, political, educational and philosophical. Selections from his writings entitled "Medical Inquiries and Observations", 5 vols., were published 1789–98, and a collection made by himself and entitled "Medical Inquiries and Observations upon the diseases of the Mind" appeared in 1812. These were the more important of his medical works.

The so-called system of Dr. Rush rejected the complicated nosology of Cullen, and referred all diseases to a morbid excitement, induced by irritants acting upon previous debility. Hence his therapeutics recognized but two classes of remedies, depressants and stimulants, and the duty of the physician, after having decided upon the class of disease from which his patient was suffering, consisted simply in selecting the most appropriate depletive or stimulant as the case might be. "Fevers of all kinds are preceded by general debility, natural or accidental. From this a sudden accumulation of excitability takes place, whereby a predisposition to fever is created." . . . "All diseases are preceded by debility. There is but one exciting cause of fever, and that is stimulus; and that consists in a preternatural and convulsive action of the blood vessels. All the supposed varieties of fevers have but one proximate cause, and that is morbid excitement." The favorite remedies of Dr. Rush were venesection and calomel, both of which he employed with a freedom which to us of the present day at least seems like recklessness. Calomel he called "the Sampson of the materia medica", a statement which readily called forth from his opponents the witty rejoinder that in this point at least Dr. Rush was correct, for calomel, like its athletic namesake had most undoubtedly "slain its thousands". In the terrible epidemic of yellow fever which ravaged Philadelphia in 1793 Dr. Rush began his treatment with a sharp purge of ten grains each of calomel and jalap, and the effects of this powder, "especially when repeated according to circumstances, not only answered, but far exceeded his expectations" (Thacher) — a result which, unless the type of fever has greatly changed since his day, we can readily understand, though not in the precise sense intended by his biographer. Rush's purging powders, of which it may be said to the doctor's credit that he at least made no secret, were sold by the apothecaries almost as a specific for yellow fever. Their use was to be followed by a venesection of 10–12 ounces, and this course of purgation and blood letting was to be repeated until the patient recovered — or succumbed. Dr. Rush's system of treatment of course met with warm opposition, and violent and vituperative disputes were waged in the newspapers over its merits. At the head of the opposition to Dr. Rush stood Dr. William Currie (1755–1829) of Philadelphia, author of an "Historical Account of the Diseases which occur in the different parts of the United States", (Philadelphia, 1792), "A Treatise on the Synochus Icteroides or Yellow Fever" (Phila., 1792) and other works, while the afterwards eminent surgeon Dr. Philip Syng Physick (1768–1837) related in the "Gazette of the United States" (1797) a successful case under Rush's treatment, in which the patient had been bled 22 times in 10 days and had thus lost 176 ounces of blood, and Dr. John Redman Coxe (1773–1864), then just beginning his career of success in Philadelphia, reassured the timid public by gravely informing the readers of the newspapers that every man of medium size possessed 400–450 ounces of blood in his own right, and might therefore spare the trivial loss of a venesection without any danger. — Dr. Rush's eminent position as a patriot and a professor in the chief school of medicine in the United States undoubtedly lent to his precepts and example a force which even their intrinsic merits would under less favorable circumstances have scarcely won for them.

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[1] There were no less than five physicians in the Congress which declared the independence of the United States, viz: Benjamin Rush of Pennsylvania, Josiah Bartlett and Matthew Thornton of New Hampshire, Oliver Wolcott of Connecticut, and Lyman Hall of Georgia. In the Provincial Congress of Massachusetts in 1774–75 there were also no less than 22 medical men. It was Dr. Samuel Prescott of Concord who accompanied Paul Revere and William Dawes in their hasty ride to inform the people of the expedition of the British to capture the military stores at Lexington, and Dr. Joseph Warren sealed his devotion to liberty with his blood. Physicians may well glory in the conduct and reputation of their Revolutionary colleagues.

Practical anatomy began to be cultivated, as we have seen, with some regularity from about the middle of the century. The bodies of executed criminals were occasionally furnished by the authorities for the purpose of dissection, but undoubtedly the chief supply of anatomical material was obtained surreptitiously by the robbing of cemeteries. Popular prejudice against the dissection of the human body ran high, and the "Doctors' Mob" of 1788 in New York, which for two days defied the control of both the civil and military authorities, bears witness to the intensity of this feeling. In the same year the body of an executed criminal, which had been given to the doctors for dissection by the authorities of Baltimore, was forcibly taken from them by the enraged populace. Secret dissections were performed in Harvard College as early as 1771, twelve years before the foundation of its medical department, but the practice was legal felony in Massachusetts for sixty years longer. According to Holmes, the textbooks in anatomy toward the close of the century were "probably Cheselden and Monro, perhaps Winslow, and for those who could read French, Sabatier. The Professor himself had the magnificent illustrated works of Albinus and of Haller, the plates of Cowper (stolen from Bidloo) and others. The student may have seen from time to time, if he did not own, the figures of Eustachius and of Haller."

No special professor of physiology existed in any medical school in this country during the 18th century. The imperfect state of physiological science, and particularly of experimental physiology, during this period rendered a special instructor in this department superfluous. The ordinary physiological text-book during the latter half of the century seems to have been Haller's "Primæ Lineæ Physiologiæ", which appeared in 1747 and was translated into English in 1754.

Surgery, when we consider the circumstances of the time, has no reason to be ashamed of its position in America during the 18th century. While surgical authors were, of course, almost entirely wanting, the names of not a few capable practical surgeons have been preserved to us. Naturally the most eminent of these were the professors in the various medical schools, but numerous equally capable, though less celebrated, surgical practitioners were scattered throughout the country. — Among the professors of surgery perhaps the first place is due to Dr. John Jones (1729–1791), of the medical department of King's College in New York. A native of Long Island, Dr. Jones had enjoyed the instruction of Dr. Thomas Cadwallader of Philadelphia, Drs. William Hunter and Pott of London, and of Petit, Le Cat and Le Dran in Paris. Upon his return to this country he settled in New York, served as a volunteer surgeon in the campaign against the French in 1755, and in 1768 was appointed the first professor of surgery in King's College. In 1775 he published the first native surgical work which appeared in this country, "Plain, Precise, Practical Remarks on the Treatment of Wounds and Fractures" (New York), which, according to Billings, was a mere compilation from Ranby, Pott and others, and contained only one original observation, viz., a case of hernia cerebri following the operation of trephining. Dr. Jones was the medical attendant of Washington and Franklin, and was particularly eminent as a lithotomist. Dr. William Shippen Jr. (1736–1808), first professor of surgery in the College of Philadelphia, and Dr. Thomas Bond (1712–1784), first professor of Clinical Medicine (1769) in this country, were also eminent as surgeons, and the same may be said of Dr. John Warren (1753–1815), founder of the medical department of Harvard College. Other excellent surgeons of more local celebrity were:

Dr. Richard Bayley (1745–1801) of Connecticut, who, after a course of study under Hunter in London, settled in New York in 1772. Dr. Bayley studied carefully the pathological anatomy of croup and "putrid sore throat" (diphtheria), and was led by his investigations to distinguish the two diseases as essentially different, to inculcate the purely inflammatory character of croup and to recommend its treatment by venesection from the jugular vein, blisters to the throat, antimony and calomel. His views were published in the form of a letter to Dr. Hunter in 1781. In 1792 Dr. Bayley was appointed professor of anatomy in the reorganized medical department of Columbia College, but was transferred in 1793 to the chair of surgery, his son-in-law, the famous Dr. Wright Post, taking the professorship of anatomy. Dr. Bayley was a successful lithotomist, and in 1782 performed disarticulation of the arm at the shoulder joint. He was also distinguished as an oculist, preferring extraction to depression of the lens in cataract. In 1795 or 96 he was appointed Health Officer of the port of New York and was very active in securing the passage of the Quarantine Act of 1799. In 1797 he published an "Essay on Yellow Fever", in which he advocated the local origin of the disease and its non-contagiousness. Dr. Bayley died Aug. 17, 1801, of typhus fever contracted in the discharge of his duties as Health Officer of the port of New York.

Dr. Charles McKnight (1750–1791), a pupil of Dr. Shippen of Philadelphia, entered the army as a surgeon before the completion of his medical studies and by his abilities rose in 1780 to the position of chief hospital physician of the Middle Department. At the close of the war he settled in New York, delivered lectures on anatomy and surgery in Columbia College and, with the exception of Dr. Bayley, was the most eminent surgeon of his day. His only publication, however, was the report of an operation for the removal of an extra-uterine fœtus, published in the "London Medical Observations and Inquiries", vol. iv. Dr. McKnight is said to have been one of the earliest practitioners in New York to employ a carriage in visiting his patients. He was cut off prematurely by pneumonia at the early age of 41.

William Baynham (1749–1814), a native of Caroline County, Virginia, after receiving his preliminary education at home, was sent to London at the age of 20 years and entered a student at St. Thomas's Hospital. Here he made the acquaintance of Mr. Else, the professor of anatomy, to whom he subsequently became assistant, and under whose guidance he acquired that knowledge of anatomy for which he was afterwards so justly celebrated. Mr. Baynham's skill in the injection of anatomical preparations was marvellous for his day, and won for him the earnest commendation of William Hunter. In 1781 Mr. Baynham became a member of the Company of Surgeons of London and took up his residence in that city, but four years later returned to his native state and settled in Essex Co., where, in spite of his remote and undistinguished residence, he speedily acquired a widely extended reputation as a skilful and successful surgeon. He was particularly eminent as a lithotomist, but was also a skilful oculist and twice performed the operation of gastrotomy for the relief of extra-uterine fœtation, viz., in 1791 and 1799. Mr. Baynham was probably at least the equal of any surgeon of his day in this country, as he was unquestionably its best anatomist, but his quiet and somewhat eccentric character and remote residence, together with the absence of any extended works from his pen, have combined to render his name unfamiliar to his countrymen.

Dr. Benjamin Church (1734–1776), the first Director-General and Physician-in-Chief of the Hospital Department of the Continental Army, was also one of the most eminent surgeons of New England. In 1775 he was accused of treasonable correspondence with the enemy, tried by court-martial and imprisoned. After remaining in prison for eighteen months he was allowed to depart for the West Indies, but the vessel in which he sailed was lost at sea.

Thomas Kast (1750–1820) of Boston, Samuel Adams (1738–1828) of Westchester County, N. Y., Gustavus Brown Horner (1761–1815) of Fauquier County, Virginia, James Sykes (1761–1822) of Dover, Delaware, Andrew Wiesenthal (1762–1798) and Lyde Goodwin of Baltimore were also eminent surgical practitioners.

Midwifery during the first half of the 18th century remained almost exclusively in the hands of ordinary midwives, whose qualifications consisted simply in a more or less extensive personal experience. In difficult cases only were physicians called upon for aid. Probably the earliest regular obstetrician of the colonies was Dr. John Moultrie of Charleston, a Scotchman who came to this country in 1733 and died in Charleston in 1773. The earliest notice of any male obstetrician, however, is found in the following extract from the "N. Y. Weekly Post Boy" of July 22, 1745:

> "Last night (Sunday, July 21) died in the Prime of Life, to the almost universal Regret and Sorrow of this City, Mr. John Dupuy, M. D., Man Midwife; in which last Character, it may be truly said here, as David did of Goliah's Sword, there is none like him.

Dr. James Lloyd (1728–1810) of Long Island, a pupil of William Hunter and Smellie who settled in Boston in 1752, is said to have been the earliest regular practitioner of obstetrics in New England, while a Dr. Attwood of New York City "is remembered as the first Dr. who had the hardihood to proclaim himself as a man midwife: it was deemed a scandal to some delicate ears, and Mrs. Grany Brown, with her fees of two or three dollars, was still deemed the choice of all who thought women should be modest." This was in 1762. The earliest public teacher of obstetrics in this country, however, was Dr. William Shippen Jr. of Philadelphia, whose first course on this subject was delivered in 1762. Dr. John V. B. Tennent, F. R. S., a native of New Jersey and an alumnus of the University of Edinburgh, was appointed in 1767 the first regular professor of midwifery on the organization of the Medical Department of King's College, N. Y., in that year. On the death of Dr. Tennent in 1770 he was succeeded by Dr. Samuel Bard. The following advertisement appeared in the "Pennsylvania Gazette", Jan. 1, 1765.

> "Dr. Shippen, Jr., having been lately called to the assistance of a number of

women in the country in difficult labors, most of which were made so by the unskilful old women about them: the poor women having suffered extremely, and their innocent little ones being entirely destroyed, whose lives might have been easily saved by proper management: and being informed of several desperate cases in the different neighborhoods which had proved fatal to the mothers as well as to their infants, and were attended with the most painful circumstances, too dismal to be related! He thought it his duty immediately to begin his intended Courses in Midwifery, and nas prepared a proper apparatus for that purpose, in order to instruct those women who have virtue enough to own their ignorance and apply for instruction, as well as those young gentlemen now engaged in the study of that useful and necessary branch of surgery, who are taking pains to qualify themselves to practise in different parts of the country with safety and advantage to their fellow citizens." (Wickes.)

So far as is known no women possessed of "virtue enough to own their ignorance and apply for instruction" presented themselves, but Dr. Shippen's effort to inaugurate a school for midwives deserves all honor. The Doctor also supplied "convenient lodgings" for the accommodation of a few poor women during their confinement, and thus established a sort of lying-in asylum or hospital. The chair of midwifery in the College of Philadelphia continued united with that of anatomy until 1810, when a professorship of midwifery was instituted here, as in New York at a much earlier period. The only special legal regulations for midwives of which we have any record are contained in the following ordinance adopted by the authorities of New York City, July 16, 1716.

"It is ordained that no woman within this corporation shall exercise the employment of midwife until she have taken oath before the mayor, recorder or an alderman (the terms of which are prescribed) to the following effect: That she will be diligent and ready to help any woman in labor, whether poor or rich; that in time of necessity she will not forsake the poor woman and go to the rich; that she will not cause or suffer any woman to name or put any other father to the child, but only him which is the very true father thereof, indeed, according to the utmost of her power; that she will not suffer any woman to pretend to be delivered of a child who is not indeed, neither to claim any other woman's child for her own; that she will not suffer any woman's child to be murdered or hurt; and as often as she shall see any peril or jeopardy, either in the mother or child, she will call in other midwives for counsel; that she will not administer any medicine to produce miscarriage; that she will not enforce a woman to give more for her services than is right; that she will not collude to keep secret the birth of a child; will be of good behavior; will not conceal the birth of bastards" etc.

In the winter of 1789 Dr. George Buchanan of Baltimore delivered a course of lectures on the "Diseases of Women and Children" to a class of nine students, and at the same period Dr. Andrew Wiesenthal lectured at his own house on anatomy, physiology, pathology, operative surgery and the gravid uterus. During the succeeding winter Dr. Buchanan also delivered a course of lectures on midwifery, in conjunction with several other lecturers on other departments of medicine (Quinan).

During the whole of the 18th century the majority of physicians prepared their own medicines, as in country districts at the present day.

In the cities the apothecaries also practised medicine as in England. According to Toner, Dr. John Morgan of Philadelphia in 1765 was the first physician to publickly advocate the separation of the duties of the physician and pharmacist. Medicines were commonly compounded in accordance with the pharmacopœias of London or Edinburgh. The earliest example of a special American pharmacopœia is that drawn up by Dr. William Brown (probably the successor of Dr. Rush as Physician-General of the Middle Department) and published at Philadelphia in 1778. It was printed entirely in Latin upon 32 pages, the printed text occupying upon each page a space 4¼ inches in length and 2½ inches in width. and was designed specially for the use of the Continental Army. This pharmacopœia bears the date "Lititz, Mart. 12, 1778", and was evidently issued from the military hospital located at Lititz, Lancaster County, Pennsylvania. As the first essay at a domestic pharmacopœia in the Western World its title page is worthy of preservation:

PHARMACOPŒIA
Simpliciorum & Efficaciorum,
In Usum
NOSOCOMII MILITARIS,
Ad Exercitum
Fœderatarum Americæ Civitatum
Pertinentis;
Hodiernæ Nostræ Inopiæ
Rerumque Angustiis,
Feroci hostium sævitiæ, belloque crudeli
ex inopinato patriæ nostræ illato debitis,
Maxime Accommodata.

Auctore GULIELMO BROWN, M. D.[*]

Editio Altera.

Philadelphiæ:
Ex Officina Caroli Cist.
M. DCC. LXXXI.

The little pamphlet contained 84 formulæ under the head of "Medicamenta Interna" and 16 under that of "Medicamenta Externa seu Chirurgica", though singularly enough the "Epithema Vesicatorium", "Fotus Anodynus", "Linimentum Comphoratum" etc. are placed among the medicamenta interna, while the "Tinctura Myrrhæ et Aloes" appears among the medicamenta chirurgica.

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[*] This is a *fac simile* of the title page of the 2nd edition of Brown's Pharmacopœia, reprinted by "The American Journal of Pharmacy", Sept. 1884. In that of the first edition it is said that the name of the author does not appear and the publishers are Styner and Cyst.

A general idea of the price of ordinary drugs about the middle of the last century may be gathered from the following items extracted from a price list published in the "New York Weekly Post Boy", June 18, 1750:

"For Ready Money, York Currency.

	£.	s.	d.
All Compound Waters, per Gallon	1	0	0
Cantharides. per Pound	0	15	0
Electuarium Mithridat.	0	7	0
Theriaca Andromachi	0	7	0
Emplastrum Diachylon	0	1	8
Gum Ammoniac, per Pound	0	7	6
Gum Arabic	0	2	0
Gum Assæ Fœtidæ	0	10	0
Gum Camphor	0	14	0
Gum Opium	0	12	0
Manna opt.	1	10	0
Fol. Sennæ, Alex.	0	10	0
Ivory Glyster Pipes, per Doz.	0	4	6
Phial Corks, per Gross	0	1	0"

The more important proprietary medicines about the same period are enumerated in the following advertisement:

"Just imported, and to be sold Wholesale or Retail, by Patrick Carryl, at the sign of the Unicorn & Mortar, in Hanover Square,

A compleat Assortment of Drugs and Medicines, as also Perry's and Betton's British Oil, Cripple curing Oil, Bateman's pectoral Drops, Turlington's Balsam of Life, Duffy's Elixir, Anodyne Necklaces, Stoughton's Bitters, Hungary Water, Hooper's Female Pills, Lockyer's Pills, Shop Furniture for Apothecaries, Vials, Pots" etc., etc. (The N. Y. Weekly Post Boy, January 28, 1751.)

According to Toner, the earliest regulation of the fees of practitioners of medicine and surgery in the colonies is found in an act entitled "An act for regulating the fees and accounts of the practicers in physic", passed by the General Assembly of Virginia in 1736. By this act "Surgeons and apothecaries, who have served an apprenticeship to those trades", were allowed:

	£.	s.	d.
"For every visit and prescription in town or within 5 miles	0	5	0
For every mile above 5 and under 10	0	1	0
For every visit of 10 miles	0	10	0
And for every mile above 10	0	0	6
With an allowance of all ferriages in their journeys.			
To surgeons for a simple fracture and cure thereof	2	0	0
For a compound fracture and cure thereof	4	0	0
But those persons who have studied physic in any university, and taken any degree therein, shall be allowed for every visit and prescription in town or within five miles	0	10	0
If above 5 miles, for every mile more under 10	0	1	0
For a visit if not above 10 miles	1	0	0
And for every mile above 10	0	1	0
With an allowance of ferriages as before."			

The act further provided that each prescription must be accompanied with a bill specifying the name, quantity and price of each ingredient entering into the composition of the same, under penalty of non-suit in case of any action founded upon such bill.

Wickes also furnishes us a "Table of Fees and Rates" established by the New Jersey Medical Society in 1766. According to this table,

	£.	s.	d.
Visiting in towns, whereby the physician and surgeon can readily attend the patient without riding, to be charged for according to the duration of the ailment and degree of attendance, viz.: In slight cases, whereby a visit or two may be wanted	0	0	0
In other cases requiring longer and daily care and attendance: for each week's attendance, and in proportion for lesser or more time, exclusive of medicines	0	10	0
Visits in the country under half a mile to be charged for as in towns, viz., per week etc.	0	10	0
Every visit above half a mile, and not exceeding a mile and a half.	0	1	6
Every visit above one and a half miles, and not exceeding fifteen miles, for each mile additional	0	1	0
Every visit above 15 miles, and not exceeding 25 miles, for each mile above 15 and under 25	0	1	6
Every visit above 25 miles for each mile above 25	0	2	0
Every visit in the night, exclusive of other things	0	5	0
Consultation fees, viz.: Every first visit and opinion by the consulted physician or surgeon, exclusive of travelling fees	0	15	0
Every succeeding visit and advice by ditto	0	7	6

Fees for surgical operations and services, exclusive of visits and traveling charges, viz.:

Phlebotomy, 1s. 6d; Extracting a tooth, 1s. 6d; Cutting an issue, 2s; Cupping with scarification 2s; catheterization, each time, 7s. 6d; Administering a clyster, 3s. 9d; trepanning, £3; couching or extracting cataract, £3; iridectomy, £3; amputations of the arm or leg, £3, and each subsequent dressing for 14 days 5s; lithotomy, £5, and each dressing 5s; Midwifery — natural delivery, £1 10s; in a preternatural case, £3; instrumental cases, £3.

Fractures — of nose, £1 7s; of jaw, £1; of clavicle, £1 10s; of arm £1 10s; of leg, £2, etc.

Simple gonorrhœa, including medicines, £2 5s; when attended with chancres or particular trouble £3.

These rates are computed in "Proclamation Money", which estimated six shillings to the dollar and remained the legal standard down to the Revolution.

According to Wickes, wages about this same period were 2s. 6d. to 3s. 6d. per day; shelled corn, per bushel, 3s. 6d. to 4s; wheat, 5s. to 6s. 7d; rye, 3s. 6d; buckwheat, 2s. 6d. to 3s; flax, 9d per pound; butter, 1s. 6d; sugar, 7d; oats, per bushel, 1s. 6d. In 1760 the salary of the Governor of New Jersey was £1000 proclamation money, equivalent to about $2500 in our present money.

In 1781 a club of physicians in Boston established for their own protection the following tariff of fees:

For a single visit in the city	$0.50
Consultation	1.00
Night calls	1.00
Obstetrical cases	8.00
Capital operations in surgery	£5 0s. 0d.
Reducing a dislocation or setting a fractured bone	£1 1s. 0d.
Bleeding, opening an abscess, extracting a tooth	$0.50

to which was to be added the usual fee for a visit.

The original organization of the "Hospital" (Medical Department) of the Continental army, estimated for a force of 20,000 men, was adopted by the Continental Congrsss July 27, 1775, and provided for

One Director-General and Chief Physician, his pay, per day	$4.00
Four surgeons with pay per day	1.33⅓
One apothecary, with pay per day	1.33⅓
20 Surgeons Mates (assistant surgeons), with pay per day	0.66⅔
One clerk,	0 66⅔
2 Storekeepers, with pay per month of	4.00
One nurse to every 10 of the sick, with pay per day of	0.06⅔

In 1776 the pay of hospital surgeons was increased to $1.66 per day, that of mates to $1.00 and that of hospital apothecary to $1.66, and in May 1778, in consequence of the depreciation in Continental money, the pay of surgeons was again raised to $60, and that of mates to $40 per month.

The first Director-General and Chief Physician of the Continental Army was Dr. Benj. Church of Massachusetts. He was dismissed on charges of treasonable correspondence with the enemy, and succeeded, Oct. 17, 1775, by Dr. John Morgan of Philadelphia, who was in turn dismissed the service and succeeded by Dr. William Shippen, April 11, 1777.

It has been usually assumed that the colonial period of American medicine was a period peculiarly infested with quacks and charlatans of all varieties. I suspect, however, that this assumption is scarcely warranted by the facts of the case, and that the mistake has arisen, to some extent at least, from confounding the popular signification of the term "quack" with its genuine meaning. In the popular sense of the term, a "quack" is a practitioner who has received no "regular" (i. e. collegiate or university) medical education. According to our lexicographers, however, a quack is a boastful pretender to skill or knowledge which he does not *really* possess. It will readily be seen, therefore, that the possession of numerous medical diplomas does not necessarily exempt the holder from a just charge of quackery, in its true and legitimate sense. Dr. Douglass of Boston, writing to Dr. Cadwallader Colden of New York in 1720, says:

> "You complain of the practice of Physick being undervalued in your parts and with reason; we are not much better in that respect in this place; we abound with Practitioners, though no other graduate than myself, we have fourteen Apothecary shops in Boston; all our practitioners dispense their own medicines."

Now while Dr. Douglass was at this period the only regularly graduated physician in Boston, it would be manifestly unfair to call Dr. Zabdiel Boylston and others of his contemporaries "quacks", though so much is implied in Dr. Douglass's statement. William Smith, in his "History of the Province of New York from its First Discovery to the Year 1722" (London, 1757), writes:

> "The History of our Diseases belongs to a Profession with which I am very little acquainted. Few Physicians amongst us are eminent for their Skill. Quacks abound like Locusts in Egypt, and too many have recommended themselves to a full Practice and profitable Subsistence. This is the less to be wondered at, as the Profession is under no Kind of Regulation. Loud as the Call is, to our Shame be it

remembered, we have no Law to protect the Lives of the King's Subjects from the Malpractice of Pretenders. Any Man at his Pleasure sets up for Physician, Apothecary and Chirurgeon. No candidates are either examined or licensed, or even sworn to fair practice. In 1753 the City of New York alone boasted the Honour of having above forty Gentleman of that Faculty."

Here too the historian undoubtedly employs the term "quack" as synonymous with irregular practitioner, i. e. one not possessed of a collegiate or university education. In this sense undoubtedly the colonies *were* overrun with "quacks". Toner says "There were probably not 3,500 physicians, all told, in the United States when the colonies declared themselves independent of Great Britain. It is further probable that there were not much, if any, over 350 who had received a medical degree." Of course then nine tenths of the colonial practitioners of medicine were irregular physicians, or popularly "quacks". Something too may reasonably be allowed for the "pride of place" of the writers quoted. Both were highly educated and, in some respects, learned men, who doubtless looked down with compassionate scorn upon their unfortunate contemporaries whose circumstances had not permitted them to enjoy advantages similar to their own. It is no uncommon thing, even at the present day, to read in our journals and newspapers contributions from disappointed youths and dyspeptic seniors, which might lead one to the opinion that American medicine was almost wholly abandoned to charlatanism and deceit. Yet, while matters are far from what we would wish to have them, American medicine is abundantly able to care for itself. — On the whole then I find no very reliable evidence that the American colonies in the 18th century greatly surpassed their contemporary states of the Old World in the possession of quacks in the genuine sense of that term. Certainly the more showy, and therefore more dangerous charlatans of Europe found little to tempt them in the rude social surroundings and relatively impecunious condition of the Western colonists. We read very little of the itinerant oculists, lithotomists, tooth-pullers et id omne genus, whose vagaries rendered life in Europe dangerous at this period. Yet that such characters really existed also in colonial life is manifest from the following advertisements:

"Doctor Graham, Oculist and Aurist, is arrived in this City from Philadelphia, and may be consulted at his apartments at Capt. Fenton's opposite Trinity Church, in the disorders of the Eye and its appendages; and in every species of deafness, hardness of hearing, ulcerations, noise in the Ears etc. Persons born Deaf and Dumb, and those labouring under any impediment in their Speech, by applying personally, will probably be assisted. — The Doctor intends to sail for England in a few months; those, therefore, who have occasion for assistance, must apply immediately."—The N. Y. Gazette; and the Weekly Mercury, July 19, 1773.

"Doctor Dubuke, Oculist and Dentist, just arrived from Boston, begs leave to inform the Public in general that he practices Physick and Surgery, and undertakes to cure the following diseases and ailments viz.:

Any disorders in the Eyes and Ears, white swelling, green wounds, ulcers, if ever so old; wens, if ever so big; scald on the head, polipus, the cancer, cold humours, rheumatism, King's evil, salt-rheum, the yellow and black jaundice, the piles, phtiscial cough, hair lips, the bloody flux, immoderate bleeding, and the venereal disease in all its stages, without salivation.

He also acquaints the Public that he has found some medicines which cure the cancer without cutting; surprising drops which cure the gravel, so that the afflicted with the same may depend on being helped by it.

The Doctor prepares and sells extraordinary good tooth drops, which cure the toothach in one minute. Teeth powder that makes them as white as snow in a short time, and cures the scurvy in the gums. Asmatic pills which remove the complaint in a few minutes; stomach pills in boxes with proper directions. He also cleans teeth in the neatest manner, and sets artificial ones. He will wait on any Ladies or Gentlemen that will honor him with their commands, at Mrs. Elizabeth Andersons in Broad Street.

P. S.—The Doctor has got some herbs which cure the cholic in a few minutes."—The Constitutional Gazette, Oct., 18, 1775.

The same newspaper of March 9, 1776, publishes the following item of news:

"New York, March 9.—The famous Doctor Dubuke, a Frenchman who was branded here last January term for stealing indigo etc., departed last Thursday from the city in the Amboy stage boat to visit Philadelphia and the southern colonies. He professes himself a dentist, and has travelled through the eastern colonies under various names."

Probably the most magnificent piece of (conscious or unconscious) medical imposture developed in the western world during the 18th century was the system of "Metallic Tractors" invented by Dr. Elisha Perkins (1740–1799) of Norwich, Connecticut. Dr. Perkins, a practising physician of intelligence and reputed integrity of character, professed by the aid of two rods or "tractors" (the one of steel the other of brass) drawn gently over the affected part, to be able to cure local inflammations, pains in the head, face, teeth, breast, side, stomach, back, rheumatism etc. Whether the Doctor was a deceiver, or himself deceived, remains uncertain. At all events he patented his discovery in 1796, and, traveling about the country exhibiting its marvellous effects, soon excited great attention and the utmost enthusiasm. Thousands of cures were reported under the influence of the metallic tractors, pamphlets were published in explanation of the modus operandi of the new therapeutic agent, and "Perkinism" (as the system was subsequently called) was fully endorsed by many learned and intelligent physicians and philosophers. The fame of the new system soon spread to Europe. The tractors were introduced at Copenhagen in 1798 and investigated by a committee of physicians and surgeons, whose report (published in an octavo volume) was on the whole favorable to "Perkinism". After the death of Dr. Perkins his son secured a patent for the tractors in England, and in 1804 a "Perkinean Institution" was established in London under the presidency of the Right Honorable Lord Rivers. In spite of the rose-colored reports of this institution the imposture soon declined,[1] and is now remembered only as one of the numerous delusions of the past, recalled, perhaps, by the more recent developments of "metallotherapy" or Burqism.

The first well-digested attempt to regulate the practice of medicine and surgery in the colonies is found in "An Act to Regulate the Practice of Physick and Surgery in the City of New York", adopted by the General Assembly, June 10, 1760. It provided

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[1] —Its downfall in England was largely due to the experiments of Dr. John Haygarth of Bath, who showed (1799) that all the phenomena of "Perkinism" could be produced by wooden tractors.

"That from and after the Publication of this Act, no Person whatsoever shall Practice as a Physician or Surgeon in the said City of New York, before he shall first have been examined in Physic and Surgery, and approved of and admitted by one of his Majesty's Council, the Judges of the Supreme Court, the King's Attorney General, and the Mayor of the City of New York for the Time being, or by any three or more of them, taking to their assistance for such Examination, such proper Person or Persons as they in their discretion shall think fit. And if any Candidate, after due Examination of his Learning and Skill in Physic or Surgery as aforesaid, shall be approved and admitted to practice as a Physician or Surgeon, or both, the said Examiners, or any three or more of them, shall give, under their Hands and Seals, to the person so admitted, as aforesaid, a Testimonial" etc.

Violations of this act were to be punished by a fine of Five Pounds for each offense, "one Half thereof to the Use of the Person or Persons who shall sue for the same, and the other Moiety to the Church Wardens and Vestrymen of the said City for the Use of the Poor thereof."

A similar act was passed by the Legislature of New Jersey, Sept. 26, 1772. This act, however, added, among other things, the following important section:

"5. And be it further enacted by the Authority aforesaid: That every Physician, Surgeon or Mountebank Doctor who shall come into, and travel through this Colony, and erect any Stage or Stages for the sale of Drugs or Medicines of any Kind, shall for every such Offense forfeit and pay the sum of Twenty Pounds, Proclamation money; to be recovered in any Court where the same may be cognizable, with Costs of Suit; one Half to the Person who will prosecute the same to Effect, the other Half to the use of the Poor of any City, Borough, Township or Precinct where the Offense shall be committed" (Wickes).

Of American medical literature during the 18th century little remains to be said. According to Dr. John S. Billings, up to the commencement of the Revolutionary War it consisted of one medical book (Dr. Jones's treatise on fractures, already mentioned), three reprints and about twenty pamphlets. After the close of the war most of the literary contributions of American physicians were contained in the Memoirs of the American Academy of Arts and Sciences, (Boston, 1785) and the Transactions of the American Philosophical Society of Philadelphia. The earliest separate work was the "Cases and Observations by the Medical Society of New Haven County, in the State of Connecticut" (New Haven, 1788). The voluminous writings of Dr. Benjamin Rush and the works of Dr. William Curry have been already noticed. Besides these James Tytler's (1747–1804) "A Treatise on the Plague and Yellow Fever, with an Appendix" (1799), "A Collection of Papers on the subject of Bilious Fevers, prevalent in the United States for a few years past" (New York, 1796) and "A Brief History of Epidemic and Pestilential Diseases" &c. (Hartford, 1799), the latter two works by the lexicographer Noah Webster (1758–1843), deserve mention in this connexion. "An Experimental Inquiry into the Properties of Opium" by John Leigh of Virginia received the Harveian prize in 1785, and was published at Edinburgh in the following year. — Of reprints and translations of foreign works the most important were Cullen's "Lectures on Materia Medica" (Philadelphia, 1775) and "First Lines of the Practice of Physic" (Philadelphia, 1781), Van Swieten on the Diseases Incident to Armies, Ranby on Gunshot Wounds and Northcote on Naval Surgery (all three of which were published in one volume, together with the second edition of Jones's "Practical Remarks", at Philadelphia in 1776) and the writers of the London and Edinburgh schools, Brown, John Hunter, Benjamin Bell, Denman, Smellie, Hamilton, Beddoes and Robert Jackson. Translations of Swediaur on Venereal (New York, 1788) and Blumenbach's "Elements of Physiology" (Philadelphia, 1795) also appeared.

The earliest medical journal to appear in the United States was entitled "A Journal of the Practice of Medicine and Surgery and Pharmacy in the Military Hospitals of France. Published by order of the King. Reviewed and digested by M. De Horne, under the inspection of the Royal Society. Annotated from the French by Joseph Brown. No. 1., vol. i, New York: J. McLean & Co." This appeared about 1790 and consisted of select translations from the "Journal de Médecine Militaire", which was published in Paris from 1782 to 1788. The first original medical journal of the United States, however, was "The Medical Repository", a quarterly edited in New York by Drs. Elihu H. Smith (1771–1798), Samuel L. Mitchill (1764–1831) and Edward Miller (1760-1812), which appeared in 1797 and continued to exist until 1824. For seven years this journal had the field of medical journalism entirely to itself, until the "Philadelphia Medical Museum", edited by Dr. Coxe, appeared in 1804. (Billings.)

The more important epidemics which prevailed in the colonies during the 18th century were, according to Toner:

Small-pox, which appeared in Boston 1701, 1702, 1721, 1730, 1752, 1764, 1776 and 1792; in New York 1721, 1731, and 1752; Philadelphia 1730–32, 1736 and 1756; Charleston, S. C. 1700, 1717, 1732, 1738 and 1760.

Yellow fever in Boston 1796 and 1798; New York 1702, 1732, 1741, 1743, 1791, 1795, 1798 and 1799; Philadelphia in 1741, 1762, 1793, 1797–99; Charleston, S. C. in 1700, 1703, 1728, 1732, 1739, 1745, 1748, 1749, 1753, 1755, 1758, 1792, 1794, 1795, 1796, 1797, 1799; New Orleans in 1769, 1791, 1793–95, 1797, 1799, 1800.

Scarlatina (according to J. Lewis Smith first imported into the United States in 1735), in Boston 1702 (?), 1735, 1795; New York in 1792–94.

Measles in Massachusetts 1713, 1739, 1769, 1773; New York 1788 and 1795; Philadelphia 1771, 1773, 1788, 1796; Charleston, S. C. 1747, 1759, 1772, 1775.

Angina (Diphtheria) in Kingston, N. H. 1733–35; Boston 1735, 1769; New England 1737, 1742, 1787 etc.

The first quarantine act[1] adopted in the colonies was passed by the

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1. No regular system of quarantine was enforced in England until 1710. In 1720 the famous Dr. Richard Mead was authorized to draw up a system of quarantine regulations, which, after the repeal of the act of 1710, were adopted by the English government.

General Assembly of Pennsylvania in 1700, and was entitled "An act to prevent sickly vessels coming into this government". It imposed a penalty of £100 on any infected vessel which landed in the province. Other quarantine acts of greater or less severity were adopted by Massachusetts in 1701, Virginia 1722, Delaware 1726, North Carolina 1755, New York 1758, Maryland 1766 etc.

The first general quarantine act adopted by Congress was passed Feb. 23, 1799, and was designed to be supplementary to the various state acts. It was entitled "An act respecting quarantine and health laws."

H.

FOURTH PERIOD.

THE NINETEENTH CENTURY.

MEDICINE FROM THE CLOSE OF THE FIRST FRENCH REVOLUTION TO THE PRESENT DAY.

HISTORY OF CONTEMPORARY MEDICINE.

C. MEDICINE UNDER THE INFLUENCE OF REALISTIC PHILOSOPHY. (THE MEDICINE OF SCIENTIFIC SPECULATION AND OBSERVATION.)

> *Ταράσσει τοὺς ἀνθρώπους οὐ τὰ πράγματα. ἀλλὰ τὰ περὶ τῶν πραγμάτων δόγματα.* *Euripides.*

THE NINETEENTH CENTURY

has become politically the age of German precedence, a precedence founded, as we know, in our wars for independence, and still requiring for its maintenance and successful completion continued concord and unity of feeling. On the other hand, until recently we have stood in an economical point of view under English influence, and we still stand socially, and in scientific matters largely, under the influence of French doctrines. The tendency of the medical culture of our century, and of our people especially, seems a continuation, indeed sometimes an exaggeration of French medicine, a science which manifested itself as a school of pathological anatomy and diagnosis, and was established by Bichat as the so-called scientific or exact medicine. The golden age of German medicine was the 18th century; the 19th has become an era of ascendancy for French methods in medical science.

The latter century, with a nervous restlessness and a haste peculiar to our age, undertook those duties in the historical development of civilization which had been delivered to it by its predecessor. Accordingly, first of all, it rescued from their former mediæval, ignoble and all too subordinate position, a whole class of men — and the most numerous class of all — the so-called common people, heretofore excluded, if not completely, at all events unduly, from progressive culture and from participation in the enjoyment of its fruits The emancipation of the laborer and the destitute was for ever accomplished, on the one hand, by the extension of education to the common people through the diffusion of common-schools, which had never before existed, and which owe, indeed, to the 18th century their creation, but whose introduction and perfection is one of the most beautiful and most humane achievements of the nineteenth — an achievement too which originated in German lands. On the other hand, this elevation of the masses was due to a higher recognition of, and a greater respect for, ordinary labor, and to the better remuneration resulting therefrom. Hand in hand with these influences go the efforts and the achievements of our age in the improvement of the external life of the people in general, and of individual peoples. This improvement first assumed in Germany — an historic deed of wide prescience ! — the memorable form of an insurance of sick laborers by the state.[1] But in the programme of our century — the establishment of the equality of all men before the law — the extermination of serfdom and slavery is to be regarded as the most humane part. In this Denmark made the beginning in 1803 ; Russia finally followed in 1862 ; the United States, amid "streams of blood and tears" — the constant requirement of all deeds of humanity — made her record a *tabula rasa* in 1864, and Brazil completed the achievements of the Western Continent in 1888. Even in Africa and Asia the abolition of slavery is in prospect. But the animal in man continues its activity in other directions. Pure humanity can never bloom in perfection on earth !

The diffusion of education — though undoubtedly among the so-called lower classes this was at first trifling in amount and frequently an injurious and even dangerous pretence at education — and the diffusion of prosperity are indubitably the chief benefits for which the masses have to thank the present century.

Common-schools are one of the most characteristic achievements of our century, whether regarded in themselves or in their results. The pioneers in their introduction were Joh. Heinrich Pestalozzi (1746–1827) of Zürich and his pupils. Attendance upon them was first made obligatory in Germany, and this custom spread thence to other countries. To these were added, as a higher grade, the "Realschulen", the Industrial Schools as special educational institutions, and the highest grade of all, the polytechnic universities. — This diffusion of education is in part also a result of the prodigious, and in many respects monstrous, growth of the daily press, which characterizes our age above all ages since the invention of printing. Through it all modern life receives the character of publicity, and is subjected to discussion in a much higher degreee than was the case in any one of the ancient republics, so notorious for their gossip. Indeed, the very existence of domestic life, the fortress and guarantee of a healthy community as well as of good morals, seems recently everywhere endangered by this license, and threatens to cease. In the production of the same result the publication of books, as almost every volume of the modern so-called realistic and natural (emotional) school proves, takes a still greater part. How great the activity of the press has become may be shown by the single fact that in Paris alone, books to the value of 48 millions of francs appear annually. But the diffusion of education does not prevent too the bloom of the grossest superstition. Quackery under its different forms and medical superstitions of all kinds are, in the department of medicine, signs of our time, which with the utmost self-consciousness we call "enlightened". As in the last century "sham-enlightenment" was spoken of, so in the present we must speak of "miseducation" and "overeducation". It is likewise an evil sign of the times that the philosophic Malthusianism of the 18th century has been able in the 19th to develop into the so-called Neomalthusianism, i. e. the artificial prevention of the natural increase of population, and to be even preached up by English and German physicians. While in the 18th century the increase of population was the cry among princes and authors, the former (and Bismarck made the beginning) are now forced by "overpopulation" to socialistic measures in politics, and the latter into communistic theories and doctrines.

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[1] November 1, 1884, the day of the introduction of this system, should accordingly be celebrated by coming generations as a gala-day in honor of the talents of the Emperor William I. as a ruler, and the statesmanlike genius of Bismarck, so far outstripping its time.

In the tendency and course of its intellectual development the 19th century occupies not so much the position of completing, as of reacting realistically against, the idealistic tone of the preceding century. Of course, beside this realism the idealistic spirit still enters, but it always occupies the second rank, and in no century of modern times has the ruling idea appeared so prominent as in the present age, so that opposition to realism can scarcely be said to exist.

While the 18th century, in its cosmopolitism, regarded it as its chief task to rescue from the relics of mediæval restrictions and limitations the life (and particularly the spiritual side of the life) of the people, regarded as an ideal whole with common interests, or as humanity; while too it sought to attain its proposed objects in accordance with the requirements of Idealism, and undertook and effected, above all, the legal emancipation of the citizen, the third estate, in accordance with its formation, yet left the material side of life, and especially of the life of the masses, almost untouched to futurity; so the nineteenth century struggles almost extravagantly for the accomplishment of the economical, or rather the material, demands of existence. The former century dedicated its chief care to the cultivation of the intellectual, the latter applies itself to the improvement of the material life, devoting to this purpose all its intellectual power.

Accordingly our century places in the foreground the *individual*, and exposes *him* to the test of freedom, while the 18th century struggled for both these objects in the interests of the body politic. The latter century desired to emancipate the people; our own seeks to bring the individual up to the highest valuation and — exhaustion of his powers. Hence the principle of the division of labor, even in the sciences, where it has introduced the often exaggerated specialism of the present day — a specialism which in practice degenerates into charlatanism (Specialisterei). If in the investigation and study of the overgrown sciences specialism is, in many respects, useful and, indeed, necessary, so is its excess, as so often witnessed, injurious and dangerous especially to the unity of science, while it forces practice into the arms of an absolute, though concealed charlatanism. It is always too (as it was in Egypt) the companion of a far advanced civilization, which strives by over-education to resist decay.

If the last century was a century of struggle for true freedom, subordinating the individual to the good of the whole, and no longer, as heretofore, to the absolutism of rulers — the fruit of rudeness or of over-education and blind faith — the peculiar tendency of our own age is to an unbounded license, in which the individual (or association of individuals) puts his own claims before those of the body politic, regards the latter as a disturber of freedom and of free development and addresses to it his own arbitrary demands. In this category we include also the Manchester system and the self-government of individual professions and classes, inasmuch as by them Egoism is elevated into a doctrine. The 18th century was the birthday of modern republicanism, of parliamentary government or constitutionalism; our own, however, we must claim to be the era of revolutionary individualism, communism and socialism. The fruit of the 18th century was the constitutional co-operation of the educated citizen class in an enlightened government: the fruit of our own rash and too precipitate century, if, in spite of a tendency to self-destruction founded in the very essence of socialism itself, it should be able to attain maturity, will develop as an unbridled ochlocracy, a tyranny of the multitude based simply upon physical and numerical superiority, a superiority exerted to engross the possessions of the other classes, acquired by the previous labor and education of long centuries, without any recognition of the just claims resulting therefrom. As the so-called upper classes in former times generally scorned common labor, so conversely it is not recognized by the socialists of the present day as it was in the last century. Socialism is a result of the doctrine of materialism popularized and puffed up into a criterion of education, of a philosophy which in the preceding century the upper classes alone embraced, but which to the masses seems a doctrine of political economy. Hence the aim of the doctrine, originally simply philosophical (in a certain sense even idealistic) and socialistic, disappears, and it degenerates into actual revolution and anarchy. These are enhanced by the luxury of the rich, by stock-jobbing, universal and inordinate militarism, the dearth of work resulting from machine-labor etc., etc.

The over-valuation of the material is the natural consequence of the elevation of external life in the 19th century to a pitch heretofore unanticipated, and of the excessive gratification of its demands, an object for which all our physical and intellectual powers are set in motion. And if a century is to be called great in consequence of benefits to external life heretofore unattained, and of the expenditure and development of great powers in the improvement and facilitation of that life, then is our century the greatest of all. To the same result contribute the numberless and grand (in part at least) discoveries and inventions accomplished through the help of the natural sciences, whose astonishing growth has been the work of our day. To the multitude, however, they seem, and serve only as, means for the enhancement of profit, and consequently of sensuality and luxury, evils which in almost all strata of society have attained a diffusion and a degree scarcely ever before reached, and which threaten to divert man's strength entirely from his higher interests to the sphere of purely external enjoyment. Such, since the existence of states and people developed into over-maturity, have been the effects of Realism, or rather of Materialism, as the result of, and in union with, a high development of the practical sciences and a highly cultivated technics, both of which ever indicate a corresponding decline in the development of a people. For contemporaneously with their high perfection (Alexandria, Rome under the Empire etc.) the downfall of civilization has been always introduced, unless events opposed some obstacle or brought forward a new and more ideal tendency. When the summit is reached all paths lead downwards.

The realistic tendency of civilization, as a whole, in the 19th century, or rather the reaction against the idealism of the 18th, meets us from the very outset in almost every department of science, though the persistence of idealism in some of them reached down even into the second third of our century. It manifested itself first in France, whose Romanic people seem capable of embracing but very temporarily the philosophy of Idealism, which in modern times has always been substantially of German origin. And Realism *per se* should not be called injurious, so far as it supplies the necessary reaction against and supplements Idealism. But the fact that it has fallen into one-sidedness still more than the latter system, that it recognizes and admits the value of itself alone, can be only harmful.

In statecraft, instead of republican constitutionalism, appeared the absolutism or practical politics of Napoleon I., who, as we know, bore a deadly hatred against all "Idéologues". This was continued and increased by the gifted Cavour and Napoleon III., and by Bismarck, in this respect the successor of both.

In place of cosmopolitism in politics appeared the so-called policy of nationalities, an expression of the tendency of our century to the individual and the concrete. — Even the French during the 18th century, in opposition to their real nature, belonged among the "furious" champions of cosmopolitism, the child of humanism. Hence Herder said mockingly: "Manners and customs! how pitiable, as if there were still nations and national character; . . . . Indigenous philosophy! narrow circle of ideas — constant barbarism! God be praised! all national characteristics are extinguished among us! we all love each other, or rather no one needs to love another; we associate with each other, have the same customs, are courteous and happy! We have, indeed, no fatherland, no kindred for whom we live, but we are friends of humanity and citizens of the world. The monarchs of Europe even now all speak French; soon we shall all do the same! — And then — O bliss! the golden age will once more begin — where are ye, national characteristics!" (See "Auch eine Philosophie der Geschichte der Menschheit".) — But in our age it was a Frenchman, Napoleon III., who elevated "Nationality" to the ruling principle in politics, though of course the French were again to be the "Nationality", as in the last century they were understood to be "Humanity". On both occasions it was the French doctrine which was everywhere extolled. In political, as well as in ordinary life there prevails a deification of success, even at the expense of ethics, and an often brutal employment of power [1] — both phenomena not wanting, indeed, in an earlier age, but more striking in our own century.

The common people, with by far the greater part of the educated, were during the 18th century (as generally subsequent to the Reformation) thoroughly devoted to religion, as an ideal good, and accordingly stood under the influence of the only Idealism which they, as a rule, recognize and cultivate. The intellectual characteristic of the 19th century, Realism and Materialism (and Nihilism, Socialism and Anarchy, which spring from both), on the other hand, impresses its stamp not only upon theology, which in a certain sense it even benefits, but also — and here comes in the actual injury — upon the religious side of the life of the people. The masses incline to these doctrines, have an unmistakable tendency to irreligion, or in other words their Idealism is meeting destruction at the hands of Materialism.

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[1] It would be ludicrous to exemplify this statement by Ernst Schweninger, as the matter is of too little importance; still he ought to be mentioned, since his activity is displayed in the sphere of medicine.

This is not contradicted by the religion of creed and letter which has recently become so prominent, and in which even positivism endeavors to replace the lack of an inner acceptance of the religious idea. The success of the materialism of Feuerbach and Strauss is a loud witness to the decay of popular life in a religious point of view. — The Christian religion was most idealistic and — most powerful during the short period when the doctrines of its founder were not yet forged into unbending creeds. With the latter began substantially its destruction, and only the Chinese rigidity of the Catholic doctrine and regulations (mistaken by many for admirable and grand, while they merely assure its permanence), as well as the later subjection of its servants to the despotism of the unnatural, their internal demoralization and the artificial maintenance of stupidity among the people — a crime in which the temporal authorities must share the blame — preserved the structure from falling. Protestantism was substantially nothing but an idealistic reaction against Positivism and Realism, in other words against rigid faith in dogma. It led — or should have led — Christianity back to the ideas upon which it is based, and only so far as it did this was it vigorous and effective. It too has now lapsed into Realism, the product of Rationalism, or among the orthodox in a very large degree into pure faith in creeds. The civilized people of Antiquity, however, began to perish when their masses began to withdraw from their adherence to the prevalent religious Idealism and to lapse into a skeptical and nihilistic Materialism, however different its fashion from that of the present day. This is a sign of waning civilization.

Realism, in the shape of an inclination to seize the actual, while disregarding the speculative in form, the tendency towards the real at the expense of the ideal, shows itself in our century even in the various departments of art, in all of which a realistic, reproductive and representative method prevails to-day, quite in contrast to the idealistic and productive activity of the last century.

In art, in accordance with the constitution of that department, this idealistic tendency continued longest. Yet compare the ideal forms of the poesy of a Schiller or a Goethe (though the latter in many of his poems already favored the transition — the "two souls in his breast" are symbolic of the struggle which prevailed between the two tendencies within him) with the realistic conceptions and exhibitions of the modern drama. A few only form an exception to the rule, though even these are forced to recognize the realistic tendency. Tragedy, the ballad and similar species of composition, to which ideal creations have always been chiefly adapted, have lost their popularity almost entirely, while romances, novels, plays founded upon adultery etc., as creations of the day and thoroughly realistic in presentation, are quite in vogue. Indeed this is so far the case that we now speak of a "realistic school" as we used to speak of a classical or romantic school. In sculpture the forms of a Canova (1757–1822), a Dannecker (1758–1841), a Rauch (1777–1857) and others furnish objects for comparison with the realistic (in a good sense) specimens of E. Rietschel (1804–1861) and his school. Painting, as is well known, likewise cultivates the realistic tendency, often, indeed, the open cultivation of the senses and of sensuality, naturalism, brutalism and sensationalism. Finally in music the same thing is seen in Richard Wagner and his school, to say nothing of Offenbach. — Meritorious as this realistic reaction against a one-sided Idealism may be, it must not be forgotten that in its excess it drags mankind down to the triteness of every day life, instead of elevating it, though such elevation has ever been, and must always be, the duty of art, if it is to be art in reality.

In the sciences realism has the upper hand, manifesting itself partly by a one-sided cultivation of the inductive method — to-day we attempt to construct even a system of "inductive morality"! — and, on the other hand, appearing as a realistic and natural conception and explanation of their scope, so far as the latter permits, and by a preference for the practical sciences. The predominant cultivation of the natural sciences in our age is both an expression and a cause of the intellectual peculiarity of our century, and the characteristic tendency of the latter to individualism, instead of the universalism of the last century, expresses itself in the general cultivation of branches, or the division of each science into an ever increasing number of special departments, that specialism which originated in France though it does not reach its acme in that country. This specialism, particularly in medicine, threatens to degenerate into charlatanism (Specialisterei) in science and practice, and thus there is danger that the connexion between the individual and separate offshoots and the parent stem may be lost, and dexterity and routine in particulars may take the place of thoughtful, organic comprehension of the whole.

Another peculiarity of the medicine of the present day, the almost exclusive study of the present, whose trifling services are frequently overestimated, is manifestly connected causatively with the phenomenon last mentioned; for science, thus subdivided, no longer seeks connection with science as a whole, and has no faith in it, because the branches newly separated from the parent stock are regarded as so many actually new sciences, particularly as the new remedies and facts which our age has undoubtedly supplied in magnificent abundance, favor this appearance of complete novelty. Data for the history of these individual branches, wrested chiefly from their historical connexion, render obscure their historical union with the higher achievements of medicine as a whole, and impart to the early history of these branches a fragmentary or disconnected air; so that to begin the connected history of the latter with the present time must make the past seem of little importance, or even utterly useless. To the specialism of the present day, which obtrudes itself upon us in most extensive and utterly unorganized cyclopædias, produced by dozens of co-laborers, and has totally displaced the universalism of the earlier writers by which the physicians of the last century still distinguished themselves, is doubtless to be largely ascribed that want of interest in medical history which is so plainly manifest. For when we depreciate the connexion of a science, we begin substantially to deny its history.

Over the medicine of the present day the natural sciences, the daughters of medicine, have attained a control still more absolute than was the case during the 17th century, the realistic predecessor of our own age. This is particularly manifest from the fact that we take the natural sciences not only for our model (which would certainly be advantageous), but for our *sole* model in the treatment of medical subjects. Indeed so far is this the case that, in accordance with the programme of Bichat, we call medicine actually a natural, exact or experimental science. Hence the criticism of Buckle regarding the cultivation of the natural sciences is applicable, mutatis mutandis, to medicine: "It cannot however be concealed that they manifest an inordinate respect for experiments, an undue love of minute detail and a disposition to over-estimate the inventors of new instruments and the discoverers of new, but often insignificant facts. . . . . "In vain do we demand that they (the details) should be generalized, and reduced into order." . . . . "We want ideas, and we get more facts. We hear constantly of what nature is doing, but we rarely hear of what man is thinking." . . . . "We are in the predicament, that our facts have outstripped our knowledge, and are now encumbering its march." The same author, whose opinion is of weight as that of one who regards the matter from a stand-point none too close, thinks: "The magnificent generalizations of Newton and Harvey could never have been completed in an age absorbed in one unvarying round of experiments and observations." The cultivation of the inductive method, which in the natural sciences leads only apparently to the desired object, likewise proves this.

Only apparently, I say, because the deductive principles of the latter — affinity, atoms (a well-known philosophical doctrine of Democritus), molecular forces, gravity, motion etc. — are not made sufficiently prominent, or these very axioms brought forward *a priori* are counted as realistic discoveries. That they, however, have stood the test of induction was a result very much more easily accomplished in the natural sciences than in medicine, because the objects of the former, simple and permanent in their nature, are not subjected to constant changes of vital activity, like the more highly organized beings endowed with life and subjected to continual development.

In our medicine of the present day we do, indeed, discard the great hypotheses of an earlier age, which in the form of theories embraced the whole of science, but in their place we cultivate numerous minor theories, which frequently we do not regard as, and will not admit to be, hypotheses. The foundations and preliminaries of our knowledge of the living organism, acquired through and by means of the natural sciences, experiments etc., often pass for the actual essence of that organism, as the laws of life and its phenomena — laws which will remain metaphysical so long as the spirit, at once the creator and the object of science, is metaphysical.

As regards the actual foundations of science (without which medicine would remain a tottering structure, unreliable enough, had not much of importance been brought to light), our knowledge has been greatly advanced. Such, however, is not the case with our systematic insight into the over-luxuriant mass of material which has been collected. Facts have been "gathered to excess; yet the error of our profusion has become the occasion of our indigence" (Bacon). Such is the fact in the present case. We see the whole before the individual; or rather we no longer see the connexion of the details, because leading principles for the scientific mastery of this immense material in facts scarcely anywhere exist. These principles, if henceforth we regard medicine as a natural science, will be found — at least this is the teaching of the history of all sciences — only by way of synthesis, a method certainly the peer of analysis, and not subordinate to it, as has become almost an article of faith. To create deductive principles for the mass of actual material already collected will undoubtedly be the struggle of an historically necessary, and therefore inevitable reaction against one-sided Realism. We hope that the impulse to this reaction may proceed from Germany! Perhaps experience, acquired inductively, and deductive thought may this time succeed in so uniting, that the results of both may correspond, and the highest grade of certainty which human knowledge can attain may thus be imparted to medicine also. This would likewise imply a return to the demands of Bacon, "The main point continues to be the light of new principles, which from single threads lead with certainty back to others". and to the claims of the great philosopher and physician of Cos:

"To attain the highest degree of precision in the peculiar indefiniteness of the subjects of our art is, of course, difficult. And yet many medical cases require this grade of precision. Accordingly, I am far from asserting that we should discard the old (i. e. philosophic) medicine, as non-existent or useless, because it is not always satisfactory. For by reflection alone, in my opinion, we can also approximate the truth, and it is wonderful, indeed, to what excellent and important knowledge we have arrived in this way, and not by chance." (See Haeser, 2d. edition, p. 50).

The shadows of man's spiritual life too are as little lacking in the century of "education" and Realism. as they were in the age of Idealism and "enlightenment" in medicine. In this connexion we mention only Mesmerism or animal magnetism, which continued to haunt us down in to the second half of the present century; Somnambulism, Spiritualism, to which, singularly enough, men like Wallace, Maximilian Perty, Crookes, Varley (the Englishmen among these were members of the Royal Society), Zöllner, Weber and others, were devoted. We may notice the religious fraud of the miraculous cures at Treves. Lourdes, Marpingen etc., to say nothing at all of table-turning, infallibility and all the superstition which still secretly prevails in medical matters among high and low. The most highly educated were, as we know, by no means exempt from the belief in Mesmerism, the infallibility of a man etc., and a considerable portion of mankind, from that day to this, has more readily followed impostors and fools than the light of reason, even when perfectly able in other respects to make use of the latter.

1. INFLUENCE UPON MEDICINE OF PHILOSOPHY, THE NATURAL SCIENCES, TECHNICS, THE PRESS, LEARNED ASSOCIATIONS AND THE UNIVERSITIES.

That philosophy has, from the outset, exercised a great influence upon medicine, originally as a part of this science and subsequently rather as a principle in the treatment of its subjects, as a dispenser of the method of investigation, is proven by the whole past history of medical art. Only in the centuries of the modern period it has happened conversely that the products of medicine, i. e. of her daughter branches, the natural sciences, have maintained great influence upon philosophy.

In the 18th century finally the views of Cabanis and the Vitalists, of Condillac and of Bichat showed especially this mutual influence of the two branches of science upon each other. And the most recent tendency in medicine likewise stands under the influence of the Frenchmen last mentioned, and demands obedience to the pure Baconian principles. Bacon, however, by no means regarded the perquisition of the actual as the ultimate object of science, but rather called it the way toward the end of causal knowledge. He considered observation and registration of facts the preliminaries and prelude to this knowledge, but the chief object, the conclusions which the mind by the aid of these draws with reference to the final causes of things. Nor would he finish with observation of the senses as such, nor remain satisfied with the products of such observation.

If the dualism of Kant, who accepted the real and the ideal side by side, had no direct influence upon medicine, although J. Jac. Bernhardi, professor in Erfurt, 1805, employed his doctrines in the definition of health and disease, still less could this be the case with the Idealism of J. G. Fichte (1762–1814), who brought forward the "Ego" as the creative principle, and the world as its image, i. e. the image of God. The influence which the philosophy of the physician

F. W. J. von Schelling (1775–1854) exercised upon medicine was, however, much greater. This philosophy (in opposition to the critical tendency of Kant, which promoted in Germany the enlightement of the 18th century), like that of Spinoza, taught the equality of the real and the ideal.[1]

This philosophy, in its day regarded almost as a revelation from heaven, but in fact merely a beatifying "philosophy of identity", takes for its starting point the absolute unity, the All, identical with God, the self-willing, self-affirming, who only reveals himself but cannot be cognized. "The eternal purity in eternal plenitude and the eternal plenitude in eternal purity is God, eternal affirmation as well eternally affirmed by himself, in a way absolutely simple and indivisible. God is therefore the indifference of ideal and real, soul and body, the identity of subjectivity and objectivity. . . . This absolute identity of the subjective and objective is not the peculiarity, the essence of God, but is rather the essence of all things, the absolute generality, without all dualism." What Schelling regards as cognition of the All is accomplished by reason. In it is everything and outside of it is nothing. Reason is regarded as a special force by which we effect that cognition, as an idea of God, as general cognition. The understanding, on the other hand, is a faculty which separates things, upholds the unity, and "has also no part in the idea of the absolute." — The eternal in matter, as "unity in totality", is weight, but the eternal, as "totality in unity", is light; the copula of both is the essence of things, which begets matter. The latter manifests itself in these three dimensions — weight, light and identity of both. A symbol of weight is the solid, of light the air, of the copula, water. Likewise in the organism there are three dimensions": reproduction, irritability and sensibility. The identity of these is the essence of the organism, the organism itself. Health, however, is the harmony of these dimensions. "Disease is the alteration of dimensions of the organism, by which it ceases to be a pure, untroubled reflex of the All, an originally perfectly qualitative affection."

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[1] Compare "Umrisse zur Kritik der neueren deutschen Medicin" (Munich, 1851), by Dr. H. Rohlfs, author of the "medicinischen Classiker Deutschlands", Stuttgart, Enke.

This "system" was altered in accordance with individual views by Schelling's pupils, most of whom where physicians, and particularly the "polarities", with their corresponding "indifferent points", were substituted for the few dimensions of Schelling. These polarities were accounted; sensibility — irritability — subjectivity — objectivity, electricity — magnetism, oxygen — hydrogen, acid — alkali etc., and the whole thing finally degenerated into a farce, in which, as ideas were lacking, words the more easily took their place.

The pure Rationalism of G. W. Fr. Hegel (1770–1831), whose supreme principle was "absolute reason", of which religion was regarded as a representation — the controversies arising over this question afforded support to our Materialism of the present day, though, on the other hand, they called forth an orthodox reaction — had no demonstrable direct influence upon medicine, except perhaps in the historical writing of this department, in which was still mingled the style of the romancists. Yet modern Materialism must be regarded as an emanation of the Hegelian philosophy, and has found its most spirited and influential representative in Ludwig Feuerbach (1804–1872), and its medical champions in the Dutchman Jac. Moleschott (born 1822), professor in Turin and Rome, Karl Vogt (born 1817), professor in Geneva, Louis Büchner (born 1824) professor in Darmstadt, and others.

The "exact" philosophy of Joh. Friedrich Herbart (1776–1841) depends upon subjective experience, which is supposed to direct thought. Experience is the foundation of philosophy, and the beginning of philosophy is skepticism, while metaphysics particularly is called a science of experience. This doctrine was applied to medicine by the medical philosopher Rud. Herm. Lotze (1817–1884), professor in Göttingen.

The latest philosophy, "Philosophy of the Unconscious", of Ed. von Hartmann (born 1842), which depends upon the results of the natural sciences and embraces Darwinism, is an expansion and completion of Arthur Schopenhauer's (1788–1860) pessimism and doctrine of the will. The natural philosophy of Charles Darwin[1] (1809–1882), grandson of

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[1] Charles Robert Darwin, son of the physician Robert Waring Darwin, was born in Shrewsbury, received his early education in his native city, and from the age of 16 years studied in Edinburgh and Cambridge. In 1831 he received his degree of Master of Arts, went in the same year on a journey around the world and on this occasion conceived in 1833 the first ideas of his system. This in 1836 he defined more precisely as a common descent of species. His chief work ("On the Origin of Species", 1859), was translated into all modern languages and reached in England itself six editions and 72,000 copies. In 1871 appeared "The Descent of Man, and Selection in Relation to Sex", and in 1872 "The Expression of the Emotions in Man and Animals". Darwin married in 1839, had five sons and two daughters, and from 1842 resided upon his estate Down, in Kent. He is buried in Westminster Abbey, and his coffin, like the metallic plate on Harvey's grave, bears the inscription: "Charles Robert Darwin, born Feb. 12, 1809; died April 19th, 1882." Besides Darwin's predecessors, Goethe and Lamarck, he is said to have had others among the Indians, in Aristotle, Ovid, and even among the Babylonians.

Erasmus Darwin, often regarded as a pure science of nature, is founded upon scientific investigation and an ingenious employment of individual results. Although based up to the present time upon few facts, and in spite of the skepticism of our age, it finds almost general acceptance. Its gaps are bridged over by numerous hypotheses, indeed, by fanciful theories which have originated far more with his followers than with Darwin himself, who was extremely cautious in his conclusions. Aided by such hypotheses, Haeckel formed his complete natural philosophical system, often designated "Haeckelism", a system constructed with dialectic dexterity and possessing as many admirers as opponents. In it, in accordance with the programme and bent of our age, and influenced by the eminently popular style of its author, all the cultivated were able to participate, as if it were a "new faith". Recently a natural philosophical sect in medicine too seems to be coming forward.

In France the philosophy of A. Comte (1798–1857), "Positivism", embraced also by Littré (1801–1881), a pupil of Comte, acquired some influence in medicine. It contrasts strongly with the German idealistic, utterly materialistic and atheistic natural philosophy of Schelling. Comte required of philosophy only that it should work out the general ideas and the results of the other sciences. To search after causes and objects was not its duty. His most important follower was Claude Bernard, though the whole "exact" school of France is based upon his teachings.

Comte himself was a pupil of Count Claude Henri de St. Simon (died 1825), the father of modern socialism and communism, whose "religion", gathered from his letters, was not known until 1803.

When medicine declares that, at the present day, it stands under the influence of no system, this statement is an error, for it follows realistic and materialistic doctrines as strongly as it ever did those of natural philosophy. We must, therefore, regard the tendency of "medical thought" at the present day as just as one-sided as it ever was before under the control of any other system. The watchword "natural scientific tendency" merely veils, but does not take away, its philosophical principles, and so, our ridicule of the earlier medical systems, is quite unjustifiable. "Modern" medicine embraces nothing but a theorem of investigation by the senses!

That the influence of the natural sciences upon medicine, from which they were not completely separated until the 19th century, must in our age be extensive, may be inferred from the effect of these sciences upon the general culture of the present day. It is demonstrable too, even in particulars, that in most directions this influence has been favorable, though it has not been always and in all directions advantageous to medical art, especially as Virchow himself voluntarily declared at the fifteenth meeting of "Naturalists", that the natural sciences could be studied and comprehended only imperfectly by physicians.

Even Goethe understood this: "In all our academies we attempt far too much.

. . . In earlier times lectures were delivered upon chemistry and botany as branches of medicine, and the medical student learned enough of them. Now, however, chemistry and botany are become sciences of themselves, incapable of comprehension by a hasty survey, and each demanding the study of a whole life, yet we expect the medical student to understand them. He who is prudent, accordingly declines all distracting claims upon his time, and limits himself to a single branch and becomes expert in one thing."

Thus the discoveries and doctrines in the department of botany, the eldest daughter of medicine, became in a double sense of controlling influence in the department of medicine. On the one hand, they created a better knowledge of the natural history of existing medicinal plants and revealed new plants, which were required to first pass the test of the chemical laboratory before being admitted to the sick-bed. On the other hand, they led to a new classification of plants into "natural families". In the latter respect the natural systems of the physician Augustine Pyrame de Candolle (1778–1841) of Geneva, and his son Alphonse, and of the great Viennese botanist Stephan Ladislaus Endlicher (1804–1849), like the artificial system of Linnæus in the last century, manifestly called into existence the so-called natural historical school of medicine. Moreover the discovery of plant-cells (1838) by Matth. Jakob Schleiden (1804–1881) of Hamburg, professor in Jena and Dorpat and finally in Frankfort-on-the-Main, who (according to Rohlfs) announced the discovery already foreshadowed by Oken (1805) and Heinrich Baumgärtner (1830) in their cell-theories, and the almost contemporaneous discovery of animal cells by Thomas Schwann, became in the course of time the origin of our most recent cellular Vitalism, and of the unity in our conception of organic life. Finally microscopic botany, through Schwann's discovery of the influence of lower fungi in the production of fermentation and putrefaction, called forth in medicine and surgery the most recent theory of infectious fungi, upon which Darwinism likewise exercised some influence.

From the large number of eminent botanists of our own century, which matured the physiology of plants, we may mention, beside those already noticed, the following: Jean Baptiste Antoine Pierre de Lamarck (1744–1829), the predecessor of Charles Darwin and during his life derided as a fool, and Göthe, who may also be counted among Darwin's predecessors; David Heinrich Hoppe (1760–1846), first an apothecary, then a physician, who with E. Wilh. Martius (1756–1849), professor in Erlangen (father of the famous South American traveller and botanist C. Ph. von Martius, 1794–1868, in Munich) and Stallknecht, all three at that time apothecary's assistants in Regensburg, founded in 1790 the "Botanische Gesellschaft" and the journal "Flora"; the famous Heinrich Adolph Schrader (1756–1836) in Göttingen and the equally eminent Heinr. Friedr. Link (1769–1851), in Berlin; Christ. Gottfr. Nees von Esenbeck (born 1776) in Breslau, and his brother Th. Friedr. Ludwig (1787–1837), both from Reichenberg near Erbach; Heinr. Gottl. Ludw. Reichenbach (1793–1879) in Dresden; Wilh. Dan. Jos. Koch (1771–1849) of Kusel in the Palatinate; Phil. Bruch (1781–1846), the apothecary of Zweibrücken and professor in Erlangen, who displayed numerous accomplishments, and the brothers Fr. W. and C. H. Schultz (Bipontinus); G. Wilh. Bischoff; Hugo von Mohl; Unger; Hermann Schacht; G. F. W. Meyer; Alexander Braun (1805–1877), professor in Giessen and

Berlin; Jaume and Auguste de St. Hilaire; Benj. Délessert; Sir Jos. Banks (1743-1820), famous as a companion of Cook and president of the Royal Society in London; John Hill (fl. 1760); James Edward Smith (1759–1828); Robert Brown (1773–1858), one of our greatest investigators of plants, who demonstrated the nucleus of cells and the process of fructification by the transfer of pollen to the ovule; the equally eminent John Lindley (1799–1865); Sir William Jackson Hooker (1785–1865), regius professor of botany in Glasgow; John Claudius Loudon (1783–1843); finally Aylmer Bourke Lambert (fl. 1822), Vice-President of the Linnæan Society of London, and the Spaniard Hippol. Ruiz, who rendered valuable service to our knowledge of the varieties of cinchona etc.

[To these we may add the following American botanists: Gotthilf Heinrich Ernst Mühlenberg (1753–1815); Dr. Benj. Smith Barton (1766–1815), professor of botany and natural history in the College of Philadelphia, and his nephew Dr. William P. C. Barton (died 1855), professor of botany in the University of Pennsylvania; Dr. Jacob Bigelow (born 1787); Stephen Elliott (1771–1830); Amos Eaton (1776-1842); Dr. William Darlington (1782–1863, Darlingtonia Californica); Dr. Lewis C. Beck (1798–1853); Dr. David Hosack (1769–1835), professor of botany in Columbia College and founder (1811) of the first botanical garden in the United States; Thomas Nuttall (1786–1859), an Englishman, curator and lecturer at the botanical garden of Harvard College from 1822 to 1828; Dr. John Torrey (1798–1873), professor of botany in the College of Physicians and Surgeons, N. Y., and one of the founders of the New York Lyceum of Natural History; Dr. Asa Gray (1810–1888) etc. H.]

As regards the modern microscopic investigation of fungi we must mention Bassi and Balasma (silkworm fungus, Botrytis Bassiana, 1835); Schoenlein (achorion of favus, produced experimentally by Remak); Eichstädt in Greifswald (fungus of herpes tondens and pityriasis versicolor); Goodsir (sarcina ventriculi, 1850); Keber (fungus of vaccine virus, 1854); Pollender (saw in 1855 the bacilli of malignant pustule for the first time, but proved by inoculation their connexion with the etiology of the disease in the year 1863); Davaine (preventive inoculation, still very questionable); Basch (fungus of dysentery); Klob, Pacini, Strahler (supposed cholera fungus); Obermeyer (spirochæte of recurrent fever); Koch (bacillus tuberculoseos, 1882, cholera fungus 1885, etc.); Bollinger and Israël (Actinomyces hominis et bovis[1]); Audouin (fungus in area Celsi); Tommasi-Crudeli and Klebs (intermittent fever); Neisser (gonorrhœa); E. Klebs (microsporon septicum); L. Letzerich (diphtheria); Traube (vesical catarrh); Fehleisen (erysipelas); Klebs (pneumonicoccus in the corpse, 1875); Leyden (the same withdrawn from the lungs of the living patient by means of a hypodermic syringe); Franz Ziehl (the same in sputum); Friedlaender (the same in the air); Pagenstecher and A. Pfeiffer in Wiesbaden (inoculation of lepra, tubercle bacillus, 1883) etc.

[In this connexion the excellent dissertation of Dr. J. K. Mitchell (1798–1858) "On the Cryptogamous Origin of Malarious and Epidemic Fevers" (1849), and the valuable papers of Dr. Geo. M. Sternberg, U. S. A. on the micrococcus of gonorrhœal pus, are worthy of mention. Historically too the papers of Dr. J. H. Salisbury on the contagium of various infectious diseases are likewise of interest. H.]

In more recent times (1868) E. Hallier, professor in Jena (born in

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[1] The fungus of actinomycosis seems to have been first demonstrated in this country by Prof. James Law, a veterinarian of Ithaca, N. Y., in 1883, and Prof. W. T. Belfield of Chicago in the same year. The first two cases of this disease in the human subject detected in the U. S. were presented to the Chicago Medical Society, Dec. 15, 1884, by Dr. John B. Murphy, who singularly enough had observed both. The accuracy of his diagnosis was confirmed by Drs. Belfield and Fenger. (H.)

Hamburg in 1831, at first a gardener) excited great attention in medical circles by his investigations of microscopic fungi and their development, and particularly by the application of his results to the etiology of epidemic diseases. These fungi, as early as the forties of the present century, were raised, as already mentioned, to etiological importance in the department of diseases of the skin, and El. Magnus Fries (1794–1878) and Karl Adolph Agardh, both in Lund, Chr. G. Ehrenberg[1] (1795–1876) of Delitzsch, from 1826 professor in Berlin, the Leeuwenhoeck of the 19th century, and particularly Louis Pasteur (born 1822),[2] with others before him, had occupied themselves with this subject. Henle too, as early as 1840, gave a praiseworthy impulse to the revival of the idea of a contagium animatum. Hallier's doctrine, like everything new in the present day, at once obtained numerous enthusiastic followers, including the surgeon Hüter, who even rated the fungi systematically. But it also met some quiet opponents, among whom was the famous mycologist Prof. Herm. Hofmann in Giessen, who as early as the beginning of the sixties made investigations in the same direction. The influence which this fungus-theory attained temporarily in therapeutics, medical, surgical and obstetrical, is well known.

The teachings of Hallier that the one-celled microscopic forms of fungi (cocci) were merely stadia of development of higher forms, and that certain forms of these fungi were of pathological significance, were successfully opposed by de Bary, Cohn, Klebs, Karsten, Naegeli and others, who proved that the cocci neither originated in, nor were developed into, higher fungi. Hallier too was the originator of the culture of fungi, though not of "pure cultures", which were invented by Cohn. The latter defended the doctrine of specific kinds of bacteria for the different forms, while Naegeli denied this view.

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[1] Ehrenberg held firmly to the animal nature of microscopic organisms.

[2] His inoculations for the prevention of hydrophobia are exciting much attention, but still require longer trial at the hands of other experimenters. In April 1866, according to Pasteur's own statement, he had inoculated 688 persons bitten by rabid dogs, and of these one girl only, who was not submitted to treatment until the 36th day, suffered from hydrophobia. Of 38 patients bitten by wolves, three had died. We know, however, that only a small percentage of persons bitten by rabid animals ever become actually hydrophobic, and the attack often occurs at a relatively late period. — Pasteur's inoculations against anthrax seem to have proved unsuccessful.

[This note seems to the translator to do scant justice to the eminent Frenchman. The report of a committee appointed by the Local Government Board of Great Britain in 1887 to investigate the subject of M. Pasteur's preventive inoculations in hydrophobia, and consisting of such men as Sir James Paget, T. Lauder Brunton, George Fleming, Sir Joseph Lister, Richard Quain, Henry E. Roscoe, J. Burdon Sanderson and Victor Horsley, endorses the claims of the French savant in the following terms: "The committee think it therefore certain that the inbculations practised by M. Pasteur have prevented the occurence of hydrophobia in a large proportion of those who, if they had not been so inoculated, would have died of that disease."—The inoculations against anthrax, when performed with due care, would also seem reasonably successful.

Pasteur's first inoculation of the human subject for hydrophobia was performed upon Joseph Meister, July 7-16, 1885. On Dec. 21, 1885, he began the inoculation of four children of Newark, N. J., who had been sent to him for treatment. The inoculations were completed Jan. 1, 1886, and the children reached their homes in safety Jan. 14, 1886. These were the first inoculations performed upon natives of the United States. In October 1886 Dr. Valentine Mott of New York reported four apparently successful inoculations performed by himself with virus procured from Pasteur's laboratory. H.]

On the other hand, Alfred Russell Wallace (born 1822), a future rival of Darwin in regard to the priority of the doctrine known as "Darwinism", and an eminent naturalist, and the persevering German botanist Dr. Carl Hasskarl,[1] who, though often disturbed in his life's-work by misfortune, calumny and ingratitude, was finally repaid with complete success, by their introduction (1854) of the Peruvian cinchona into English and Dutch India, rendered to practical medicine a service not even now sufficiently valued. Without this humane and characteristically professional act cinchona and its preparations, particularly under its recent abuse in medicine, would have finally disappeared from our store of drugs.

If the influence of botany upon medicine proved itself in many ways a controlling one, though substantially external, that of physics, and the mathematics associated therewith, has manifestly become much more profound, and has given the key-note to medical science. This is far more the case in our own century than during the 17th, its predecessor in this respect, though the 19th century has not produced any special "school". The latter fact is due to the division of the medicine of the present day into numerous distinct branches, and to its partition among entirely disconnected laborers, as the result of the immense mass of material collected in each department. Thus the connexion of the individual branches has been almost destroyed. The influence of physics too has not been so sharply separated from that of chemistry as was the case in the 17th century, so that, were such an expression permissible, we ought in our day to speak rather of a physico-chemical school.

In conformity to the tendency of medicine in the early years of the present century, the subjects of physics — those of botany, as we have seen, supplied at a later period the impulse to the formation of an actual school — gave occasion at least for systematic and scientific speculations on "polarity", for *a priori*, instead of the later inductive, identification of physical and corporeal forces etc. Accordingly physics has become the chief prompter and assistant in the flourishing physico-physiological experiments of the present day, while Haller, the creator of modern experimental physiology, conducted his experiments rather medically. This influence upon physiology especially, showed itself, indeed, as we have seen, in the 17th century also; but in our own century, in accordance with the increased results of physical investigation, it has become more important. Thus the laws of the lever and of mechanics in general have become the physics or mechanics of the skeleton, those of hydrodynamics, especially the laws of undulations, have become the physics of the circulation, those of filtration, of end- and ex-osmosis, explain the physics of secretion and absorption, the doctrines of the diffusion of gaseous bodies and their absorption by fluids are applied in explanation of respiration, the laws of acoustics become the physics of speech and hearing, those of optics, the physics of sight etc. The subject of electricity has gained the greatest influence over nervous physiology, and nervous physics has become, as we know, a distinct specialty of physiology. In fact even mental activity nowadays is on the road to becoming transformed into a cerebral physics. Of course in all these investigations the metaphysical forces, whose acceptance at the present day is still a logical necessity, continue disregarded, and only the *homme machine*, who is subject to these researches, is investigated, though modern materialism believes that it has already attained a contrary result. In practice too electricity has gained new interest. That our whole physical diagnosis is founded upon physics, is expressed in its very name. The rôle which the mechanical and physical acquisitions of our time are to play in (pathology and) therapeutics, is however, yet in its rudiments, and it seems as though they would call into being an actual iatro-mechanical school. How far physics has become a branch of medicine may be judged, among other things, from the fact that there are to-day special text-books on medical physics, and that the thermometer is used every day in one single large hospital more frequently than in many of our meteorological stations taken together.

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[1] He had been anticipated by F. W. Junghuhn (1858).

Among the numerous physicists of the present century we may mention: Chladni (1756–1827) of Wittenberg, the founder of acoustics and the first to give an explanation of meteorolites; Seebeck (1770–1831), who discovered thermo-electricity and entoptic figures, and was also the first to give a method for the testing of color-blindness by means of colored wool; Jos. von Fraunhofer[1] (1787–1826) in Munich, a famous optician and technologist; Reichenbach (1772–1826), an optician; Martin Ohm (1792–1872), electricity (his investigations first appeared in the famous "Annalen" of Christian Poggendorf); Sömmering, the inventor of the electric telegraph; Alexander von Humboldt; Julius Rob. Mayer (1814–1878), the son of an apothecary, superior surgeon and city physician in Heilbronn, and a kindred spirit with Copernicus, Kepler, Newton etc. He originated the mechanical theory of heat, though his priority in the matter was contested for some time by the Englishman James Prescott Joule, a brewer of Manchester, and eclipsed by Helmholtz (law of the conservation of force); Rud. Clausius (born 1822) in Bonn, mechanical theory of heat; G. A. Hirn of Mühlhausen in Alsace and others. Joh. Müller of Kassel (1809–1875), professor in Freiburg, also distinguished himself as a physicist, and particularly by his edition of the text-book of Pouillet; Kirchhoff, immortalized by his invention (in conjunction with Bunsen) of the spectral analysis (1860); Phil. Reis (died 1864), an elementary teacher in Friedrichsdorf near Homburg, the telephone (improved by Graham Bell in

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1. "The German Newton", born in Straubing, and worked his way up to immortality by his own powers, from the lowest position and in spite of the deepest poverty and want. "Fraunhofer lines" of the spectrum, inventor of a glass unsurpassed for optical purposes, inventor and improver of the achromatic microscope, of the astronomical telescope with large objectives, of the heliometer, the circular micrometer etc.

1875); Thomas Alva Edison (born 1847), electric light, phonograph etc.; Graham Bell, photophone, 1880; H. W. Dove (1803–1879) of Liegnitz, professor in Berlin, the founder of meteorology and climatology; J. B. Listing, professor in Göttingen (1803–1883), physiological optics; Rutherford, inventor of the maximum and minimum thermometer; Wollaston (1766–1828), stereoscopic vision; Leslie (1766–1839), differential thermometer, hygrometer; Daniell (1790–1845), constant current, condensing hygrometer; Michael Faraday (born 1794), electricity by induction; Grove, constant current through zinc and platinum plates; Hans Christ. Oersted (1777–1851), discoverer of electro-magnetism; Zamboni (1775–1846), dry electric piles; Francesconi, falling bodies, velocity of light etc. —Laplace (1752–1833); Urbain J. Jos. Leverrier (1811–1877), who foretold the position of the planet Neptune, which Galle in Berlin then discovered; Ampère (1775–1847), discovered the electro-dynamical phenomena, Amperian theory; Malus (1775–1812), discoverer of the polarization of light (1808); Dulong (1785–1838) and Alex. Thérèse Petit (1791–1820) together brought forward in 1819 the law of specific heat; M. H. Dutrochet (1776–1847), endosmosis and exosmosis; Fresnel (1788–1827), undulatory theory of light; François Arago (1786–1853) discovered rotatory magnetism and wrote on light, sound etc.; Jos. Nicéphore Niepce (1785–1833) discovered (1814) a process for preparing the photographic pictures which bear the name of the following scientist; Daguerre (1788–1851) improved in 1839 the process known as daguerreotyping; W. H. Fox Talbot (died 1877) discovered in 1840 the process of photography, which finds such various applications in anatomy, surgery etc., and is likely to take the place of other methods of artistic reproduction.[1] Savart (1791–1841), an eminent student of acoustics; Horace Bened. de Saussure (1740–1799), hygrometer; Théodore de Saussure (1767–1845), meteorology; John Tyndall (born 1820), a famous meteorologist and student of acoustics, mechanical theory of heat; Lambert Adolphe Jacques Quetelet (1796–1873) of Brussels exercised a decisive influence upon our modern science of statistics by his calculation of probabilities, through which he was led to the conclusion that medical art exercised very little influence upon mortality, and that this influence, so far as it went, was bad; Raoul Pictet of Geneva in 1877 exhibited oxygen in the form of a liquid, thus confirming the mechanical theory of heat, while Cailletet in Paris produced liquid air and nitrogen.

The share in the extension, and the partially new construction of the medical department of hygiene assumed recently — at the instance of the French — by physics or meteorology and the natural sciences in general, is to be welcomed as highly beneficial, inasmuch as they must supply in this department the actual foundations for medical thought, and will not devote themselves to short-lived theories of etiology, and therapeutics. The champion of this accessory branch of medicine to-day is the worthy physician, chemist, pharmaceutist and recent hygienist, Max von Pettenkofer of Munich, who by his spirited advocacy has brought into honor and zealous exercise this practical and promising department of the treatment of the body-politic, instead of that treatment of individuals, which, from a remote antiquity, has been in many respects, alas, so deceptive, and in spite of constant and great changes has always afforded so little benefit. This he accomplished too, although the earlier impulse given by the excellent pharmacologist and medical statistician Fr. Oesterlen (died 1877) had remained without any considerable effect. In the actual support of this branch

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[1] The first photographic portrait from life was taken by Prof. John W. Draper (1811–1882), of the University of New York, in 1839. (H.)

Chemistry also has a share. This science, which heretofore has gone to work almost exclusively by analysis, has recently employed also the synthetic method, so important in the preparation of alkaloids for use in medicine. The absolutely astonishing achievements of chemistry, which, in union with those of physics and mechanics, have given to our life of to-day, when contrasted with that of an earlier period, an entirely altered appearance, likewise render its influence upon the development of general medicine more prominent than is the case with any other branch of the natural sciences. And this influence has been for the most part good, since, of all the accessory sciences, chemistry has supplied the greatest abundance of valuable material, physiological, pathological and therapeutic, as the result of the unexpectedly rapid advances of organic chemistry created chiefly by the Germans. From the latter science physiological and pathological or medical chemistry have been constructed as special branches.

The influence of chemical doctrines upon the theoretical constitution of medicine showed itself in the doctrine of "crases", in its day so wide spread and evanescent, and above all in numerous minor hypotheses in pathology and pharmacodynamics etc., which for the most part appear as ingenious as fleeting. Most profound, however, was the influence of chemistry upon the development of physiology, and especially upon the doctrines of the changes of matter and of nutrition (or dietetics).

In the last two branches chemistry also introduced much one sidedness. Thus, instead of the earlier and natural methods of nutrition, there often appears at the present day — and this theory in fact penetrates to the masses — a theoretic and chemical nutrition, in which the self-acting and self-adjusting organism, the "internal chemist" of Paracelsus, is often disregarded, and considered a lifeless retort, though it certainly *selects*, while the retort simply *obeys* chemical laws. To adduce a few examples: we mention merely the theoretical feeding of the scrofulous and consumptive with "nitrogenous or carbonaceous food", which, however, in practice scarcely ever half attains its object, for the diseased organism does not assimilate this food at all; the famous "potato-blood" of the Irish, i. e. the consideration of the mental attainments of the people from the stand-point of their food, without reflecting that these attainments were the same before they used potatoes as food, and when, therefore, they could not maintain a "carbonaceous brain"; the Liebig's children's food, which, though properly constructed chemically, still remains mostly without results, because its correctly selected constituents are incorporated into the organism under a form different from that in which they exist in mother's milk; the introduction of pepsin into the supposed retort of the stomach, which does not, however, give the desired reaction because the *organ* of the stomach is concerned in the matter etc.

Pathology too is frequently ruled by chemico-physiological and chemico-pathological views. In like manner diagnosis and therapeutics receive many acquisitions and much aid from chemistry, therapeutics especially through the exhibition of purely chemical remedies, chiefly the alkaloids, though undoubtedly by means of the latter a treatment has been at times instituted allied more nearly to toxicology than to therapeutics proper. Toxicology too, on its side, has been greatly advanced by chemistry. By the numerous discoveries in the department of chemistry,[1] as well as in the other natural sciences and in technics, a large number of transient "fashionable remedies" have also been produced, to the injury of therapeutics in the eyes of both physicians and laity.

Among the chemists, the French were especially prominent in the beginning of the century, but were speedily compelled, particularly in organic chemistry, to yield the precedence to representatives of the German people. Among the numerous eminent chemists whom our century has furnished we bring forward the following: Count Claude Louis Berthollet (1748–1822) of Talloire in Savoy, at the instance of the well-known Dr. Tronchin appointed ordinary physician of the Duke of Orleans, senator and peer of France, especially meritorious for his demonstration that it was not oxygen alone which could form acids, as well as for the fact that he revised the doctrine of affinity. He founded in Arcueil, after the model of the Italian academies of the 16th and 17th centuries, a private academy, to which belonged Gay Lussac (1778–1850; volumetric theory), the famous Louis Jacques Thénard (1777–1857), Alex. von Humboldt, Collet-Descotils, Laplace, Biot, the great Swedish chemist Johann Jac. Berzelius (1779–1848; animal chemistry, doctrine of chemical proportions, a more precise determination of the atomic weights and of the atomic theory etc.), and Dulong; Louis Nic. Vauquelin (1763–1829), the discoverer of numerous inorganic and organic combinations and substances; Chaptal (1756–1832), eminent as an agricultural chemist, like J. B. Boussingault (born 1802); Jos. Louis Proust (1755–1826); J. Bapt. Dumas (1800–1884) of Alais (Gard), from his 21st year a teacher of chemistry in Paris, who investigated especially the alkaloids; Jos. Pelletier (died 1842), who with Caventou (1789–1877) discovered quinine in the year 1820; Balard (1802–1878), the discoverer of bromine, well known among us by Strecker's edition of his text-book; Victor Regnault (methylchloroform, 1840, and monochlorethyl, 1838, two anæsthetics similar to chloroform); Mich. Eug. Chevreuil, member of the Académie (born 1786, still living in Angers); Magendie; Jos. Matth. Bonavent. Orfila (1787–1852), the toxicological investigator so eminent in medicine, and others. Among the Germans: Karl Aug. Hoffmann (1760–1832), an analyst of many mineral waters; Jeremias Benj. Richter (1762–1807), founder of stœchiometry; Adolph Ferd. Gehlen (1775–1815), zoochemist in the university hospital at Halle; Joh. Wolfg. Doebereiner (1780–1849) in Jena, the discoverer of platinum black, promoter of the chemistry of fermentation, of the analyses of mineral waters etc.; Fried. Wilh. Adam Sertüner (1783–1841), an apothecary in Einbeck and then in Hameln, discoverer of the first organic base of morphium (1804, not published until 1816); Franz von Ittner (1787–1823), who prepared (1803) anhydrous prussic acid; Christ. Gottfr. Gmelin, professor in Tübingen (toxicology), and Leopold Gmelin (1789–1853), professor in Heidelberg, eminent for many labors in physiological chemistry; Carl Gustav Bischof (born 1792) in Bonn, numerous analyses of mineral waters; C. G. Mitscherlich (1794–1863) in Berlin, a famous pharmaco-chemist (isomorphism); Heinrich Rose (1795–1864) in Berlin, eminent as a perfecter of organic analysis; Reinhold von Reichenbach (died

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[1] In chemistry too we have recently begun to distinguish between "modern" (in the sense of philosophical and speculative) and "classical" (i. e. depending upon observation) chemistry. Representatives of the former, according to Albrecht Rau, are: Dumas, Aug. Laurent (1807–1853) of la Folie near Langres, and Gerhardt (1816–1855) of Strassburg, a pupil of Liebig. The chemists between Boyle and Berzelius-Liebig are representatives of "classical chemistry".

1887 in Graz), chemist; Karl von Reichenbach (1788–1869), inventor of the "Od", a pretended natural force, and discoverer of paraffin, creasote etc.; Friedr. Stromeyer (1778–1835), a famous chemist in Göttingen; the greatest of German chemists Justus von Liebig (1803–1873), who marks an epoch in the development of chemistry by his improvement of instruction (he was the founder of university laboratories, while up to this time individual teachers merely gave instruction in private laboratories), of organic analysis, agricultural chemistry, physiological chemistry etc.; Christian Friedr. Schoenbein (1799–1868) in Basel, discoverer of ozone, gun-cotton, collodion etc., a man as simple in his life as he was eminent in his science; Phil. Lorenz Geiger (1785–1836); Friedr. Ad. Aug. Struve (1781–1840), artificial mineral water; Joh. Andr. Buchner (1783-1852) in Munich; Tragendorf in Dorpat; F. L. Winckler; Em. Osann (1787–1842) in Berlin; Fr. Mohr, commentary on the Prussian pharmacopœia; Friedr. Wöhler (1800–1882) of Eschenheim near Frankfort, a pupil of Berzelius, professor in Göttingen (the first synthetic preparation of an organic body, viz. urea; investigation of substances under high pressure and low temperature; liquid and solid carbonic acid etc.), and Rob. Wilh. Bunsen (born 1811), both equally important in inorganic and organic chemistry; the eminent physiological chemists C. G. Lehmann in Leipzig, E. C. F. von Gorup-Besanez in Erlangen, Jos. Scheerer in Würzburg, Jul. Eug. Schlossberger in Tübingen, Carl Schmidt in Dorpat, Rochleder (died 1874) in Vienna. Friedr. Schödler (meritorious for his diffusion of scientific and chemical information in our intermediate schools, died 1884, æt. 71) in Worms and then in Mayence, Voit, Pettenkofer in Munich; Neubauer in Wiesbaden (died 1879, urinary investigation); Dupré and Selmi (1866 and 1873, alkaloids of dead bodies, ptomaines): Hermann Kolbe (1818–1884; salicylic acid), an opponent of the type theory of Ch. Tréd. Gerhardt (1816–1856) and his assistant Laurent, and of the so-called structural chemistry. A Niemann in Gosler (cocaine, 1860); Merck in Darmstadt (preparation of numerous vegetable poisons) and many others. One of our most important physiological chemists was G. J. Mulder (1803–1880) in Utrecht, who rendered eminent service in the study of the chemistry of the protein bodies, and demonstrated their identity in the animal and vegetable kingdoms. Among the English the following chemists distinguished themselves: John Dalton (1766–1844), founder of the atomic theory, who also in 1794 described the first case of color-blindness (in himself), though the condition was also known to Jas. Huddart in 1777. From Dalton this condition is known as "Daltonism". Sir Humphry Davy (1788–1829), the founder of agricultural chemistry, of electro-chemistry, discoverer of the metals of the alkalis, [of the intoxicating properties of nitrous oxide, inventor of the "safety lamp" etc.]; Faraday, (1791–1867); James Marsh (1789–1846), Marsh's test for arsenious acid (1836); Thomas Graham (1805–1869), [discoverer of the law of diffusion of gases (1834)]; Avogadro (molecular theory, 1811; a molecule is the most minute part of a chemical body, in contradistinction to the atom, the most minute part of matter in general); James Young (1811–1883), the chemistry and industrial uses of coal, first illumination of London with gas, 1810, etc. The various elements were discovered: iodine by Courtois, 1812; chromium by Vauquelin; bromine by Balard; cadmium by Stromeyer; boron by Gay Lussac; lithium by Arfvedson; calcium, potassium, sodium, magnesium and strontium by Sir H. Davy; selenium, silicium, thorium, barium by Berzelius; aluminium and beryllium by Wohler; cæsium and rubidium by Bunsen etc. Ladenburg in 1886–87 first prepared an artificial coniin synthetically, and this first production of a vegetable product by synthesis is of the most extended significance (in medicine also), since the way is thus opened for further advances, and a monopoly in the production of carbo-hydrates and albuminates is taken away from vegetables, though F. Cöhn at the Berlin convention of "Naturforscher" had just declared this department as yet closed against science.

Zoology too worked happily in aid of medicine. Comparative anatomy, founded scientifically by Cuvier, furnished some important revelations. It even exercised some influence upon the medical theories of natural-philosophical physicians, e. g. upon C. Rich. Hoffmann's so-called "Ideal pathology", which was in fact a pathology of comparative anatomy. Zoology proper, however, was of great advantage to the history of development. The natural history and history of development of human parasites rose to a clearness and completeness heretofore sought in vain, and the pathology, and in many ways even the therapeutic procedures, of the physician were thereby advanced. The discussion of parasites, which was specially renewed about the close of the thirties, and particularly the discussion relative to scabies, was undoubtedly the occasion for the exposition of a special theory of parasitism in diseases.

Wichmann's doctrine of the contagion by means of the itch-mite had fallen into forgetfulness, and even Schönlein said: "Whether an itch-mite is present in human scabies is to this hour problematical." M. Galès, an apothecary in the Hôpital de St. Louis in Paris, had made fallacious statements, but was unmasked and shown to be an impostor by François Vincent Raspail (1794–1878). Renucci in 1834 showed the method of finding the itch-mite commonly employed by the common people in Corsica, but Hebra was the first to defend unreservedly the doctrine of Wichmann. Eichstedt, professor in Greifswald, thoroughly studied the burrows of the mite and Krämer in 1847 demonstrated the male animal.

Among others the following zoologists and physicians made themselves of service in the advancement of our knowledge of the animal parasites of man:

The famous Oken; Richard Owen (born 1804) of London discovered the trichina, while Zenker in Erlangen in 1860 succeeded in establishing its pathological anatomy, pathogenesis and diagnosis in man. The physician Rupprecht in Hettstadt was the earliest to describe and give a name to the disease trichinosis; [in the United States the natural history of the trichina was carefully investigated by Prof. John C. Dalton in 1864, and the first cases of trichinosis, diagnosticated as such, were observed by Dr. Joseph Schnetter of New York in the same year;] Carl Theodor Ernst von Siebold (1804–1885) in Munich studied the natural history and history of development of the tapeworm, whose larvæ had been already recognized by A. Ephr. Göze (1731–1793), the friend of Linnæus and the most famous helminthologist of the last century, and subsequently von Gräfe proved them the cause of certain cases of blindness; Bilharz (distomum hæmatobium); Dubini (anchylostomum duodenale, 1837); E. Wagner (echinococcus); Beneden; Seeger; Paul Gervais; C. Davaine (1811–1882), the most famous of the French helminthologists, "Traité des Entozoaires et des maladies vermineuses", 1860; Rud. Wagner (1805–1864); above all the indefatigable Friedr. Rud. Leuckart (born in Helmstädt, 1823), at first professor in Giessen, now in Leipzig, who wrote a justly famous work in two volumes on "die Parasiten des Menschen"; Küchenmeister, and others.

Mineralogy, of course, exercised the least influence upon the development of medicine; at most the branch of crystallography in some points aided microscopic diagnosis.

Of great importance for the scientific, as well as the practical, portion of medicine, are also the discoveries made during the present century in the department of the reproductive arts, and the advances in mechanics and technics, which have been pushed to a height heretofore undreamed of.

To point out only a few of these, we may mention under the first head the arts of lithography (invented by Aloys Senefelder, died 1834) and chromolithography, of daguerreotyping (1833) and photography (1839), of wood-cutting, which has been so highly developed in our day, and has taken the place of the expensive steel and copper engraving for purposes of illustration. In the second category we may notice first of all the improvement of the microscope, and in general of the physical and mechanical apparatus employed in medicine; the pneumatic boot, pneumatic cabinet, pneumatic receivers and apparatus, the more useful industrial employment of caoutchouc, the sphygmograph, physiological, optical, chemical and surgical apparatus and instruments, the galvanic cautery, the apparatus and arrangements for the transport of the sick and for the care of the wounded and the diseased (the railroad invented by Geo. Stephenson in 1829, introduced into Germany in 1835) etc., and the results attained by their means. The improvements of the microscope especially by the engineer Selligue, the two Chevaliers (achromatism) and Fraunhofer — John Dollond (1706–1761, originally a silk-weaver) had made achromatic lenses as early as 1757 — like its invention in the 17th century, were the undoubted cause, and in part too the result, of the tendency of the medicine of our age, and particularly of German medicine, to the investigation of the smallest corporeal elements, the most minute corporeal life, whose principle it was believed had been discovered in them, without, however, drawing any nearer to its real cause. The cellular pathology of the present day, which, like all theories of the past, will remain of historic value for the future as an evidence of the medical spirit of the age, must be regarded as an expression of the influence of the microscope. The most notable microscopic technicians in our day are Giov. Batt. Amici (1784-1863) in Florence; Charles Chevalier in Paris (inventor of the immersion lens and compound objective); Kellner in Wetzlar, Oberhäuser and Hartnack in Paris, Schiek in Berlin, Jos. von Baader (died 1835), an engineer in Munich, Kuess in Hamburg, Karl Zeiss in Jena etc. Of late the instruments of Zeiss (Jena glass etc.) with Abbé's illuminating apparatus have become specially famous. Emil Stohrer (1840–1883) in Leipzig acquired great reputation as a manufacturer of electro-therapeutic apparatus. To proceed any further in our enumeration would lead us too far.

The development of the medical press in our age has not, as it seems, yet reached its climax, for its extent is daily increasing, so that, together with the not inconsiderable production of books, it threatens to attain, and, indeed, has already attained, the proportions of an illimitable flood. The experimental and statistical tendency of medicine, for the satisfaction of which a continually extending press, and an ever increasing circle of medical literati, are compelled to labor, contributes most largely to this condition of affairs.

The literary productions of the day are thus participated in by an ever enlarging circle, so that to-day, quite in contrast with the custom of earlier times, it is a great rarity for a physician not to have published at least a few interesting cases. The medical press of our day has, doubtless, been of great advantage in preserving the interest of the mass of physicians in the scientific questions of the time, in alleviating professional trials, in utilizing observations heretofore, as a rule, important merely to the special physicians therein concerned, and in investigations to a certain extent special in their nature. On the other hand, through this participation in the current questions of struggling science, the so-called medical fashions, particularly fashionable therapeutics, to which the experimenting hospital physicians or clinicians have commonly given occasion, have been promoted in practice. Another result of the wide extent of the medical press is unquestionably the decline of medico-historical studies, and the neglect of the books and observations — to say nothing of the methods of observation — of the earlier physicians, so that a retrospective glance into medicine is rare, inasmuch as the affairs of the present seem to exhaust the interest and the strength of our physicians. Finally a peculiar, and, if such an expression may be allowed, a casuistic[1] erudition and demonstration at the bedside have come into vogue, an erudition based rather upon the collected experience of others than upon personal experience and observation, to the exclusion of all deductive reasoning. By this enormous collection of cases however, the difficulty of the practitioner in utilizing the material increases. This is especially true with regard to the so-called clinical material, since the conditions under which it is collected, as well as the method and purpose of its collection, which scarcely ever pursue chiefly strictly practical aims, differ very greatly from the demands and the form of ordinary or normal practice.

An enumeration of the medical journalistic literature of our century would far transcend the limits of the present work. Accordingly only a few of the earlier and still existing examples of this literature will be mentioned, without pretending to completeness in our discussion of the subject. In the year 1878 we had in Germany no less than 78 medical organs, and in the meantime this number has been increased. Among these are: "Reil's Archiv"; Pfaff's "Mittheilungen aus der Medicin"; "Horn's Archiv"; "Meckel's Archiv": Hufeland's "Journal" (the first German weekly journal) and "Bibliothek der praktischen Heilkunde"; Gilbert's "Annalen"; Oken's "Isis"; Joh. Friedr. Pierer's (1767–1832; the ancestors of the author of the well-known "Conversationslexicon" were physicians, like himself. Gg. Peter, 1646–1685, was a physician) "Medicinische Annalen und medicinische Zeitung"; Hecker's "Literarische Annalen"; Holscher's "Annalen der Heilkunde": Gersdorff's "Repertorium der medicinischen Journalistik"; Häser's "Repertorium der Medicin"; Rust and Casper's "Kritisches Repertorium"; Kleinert's "Repertorium der medicinischen Journalistik"; Tiedemann's "Zeitschrift für Physiologie"; Rust's "Magazin für Heilkunde"; Henschel's "Janus"; "Jahrbücher der ambulatorischen Klinik in Halle"; Sach's "Jahrbücher der Leistungen der Heilkunde"; Froriep's "Notizen"; Beck's "Allgemeines Repertorium"; Oppenheim's "Zeitschrift"; Hitzig's "Annalen"; Loder's "Journal für Chirurgie"; "Heidelberger Jahrbücher"; "Gottinger gelehrte Anzeigen"; C. Hohnbaum and Jahn's "Medicinisches Conversationsblatt"; "Zeitschrift für Geburtshilfe"; "Berliner medicinische Centralzeitung"; "Archiv des Apothekervereins"; "Jenaer Literaturzeitung" (review); "Literarisches Centralblatt" of Zarncke (review); Siebenhaar and Martini's "Magazin für Staatsarzneikunde"; Casper's "Wochenschrift"; Göschen's (died 1875) "Deutsche Klinik"; Betz's "Memorabilien"; Wintrich's "Medicinische Neuigkeiten"; "Correspondenzblatt für Schweizer Aerzte"; Henle and Pfeufer's "Zeitschrift für rationelle Medicin". J. Müller's "Archiv für Anatomie, Physiologie und wissenschaftliche Medicin"; Fr. Gravell's "Notizen für praktische Aerzte", edited by Paul Guttmann; "Allgem. med. Centralzeitung" in Berlin, founded by J. J. Sachs (died 1846) in 1832; "Bayrisches medicinisches Intelligenzblatt"; Wittelshöfer's "Wiener Wochenschrift", the excellent organ of the "New Vienna School"; Schnitzler's "Wiener medicinische Presse": Bettelheim's "medico-chirurgische Rundschau", the latter two the organs of the "Young Vienna School"; "Berliner klinische Wochenschrift", the literary rendezvous of the Berlin "Natural Scientific School"; "Prager medicin-

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[1] The author seems to use this word in the unusual sense (at least in English) of "consisting of cases". (H.)

ische Wochenschrift"; "deutsche Zeitschrift für Thiermedicin und vergleichende Pathologie"; "Archiv für Psychiatrie und Nervenkrankheiten"; "deutsche Zeitschrift für Chirurgie"; Roser and Wunderlich's "Archiv für physiologische Heilkunde"; "Archiv für Geburtshilfe und Gynäkologie"; "Archiv für Ohrenheilkunde"; Ziemssen's "deutsches Archiv für klinische Medicin"; Canstatt's "Jahresbericht"; Schmidt's "Jahrbücher", edited by Prof. A. Winter in Leipzig (at an earlier period in conjunction with Herm. Eberh. Richter, 1808–1876), founder of the "deutsche Aerztebund", 1873, professor in Dresden; Varrentrapp's "Zeitschrift für Hygieine" (the first German journal devoted to hygiene. V. was the pioneer hygienist of Germany. School hygiene and particularly the "vacation colonies" of poor school children were founded by him); Reinhardt's or Virchow's "Archiv", published since 1847 in conjunction with the lamented B. Reinhardt; "Archiv für experimentelle Pathologie und Pharmakologie"; "Archiv für Staatsarzneikunde"; "Prager Vierteljahresschrift"; "Jahresberichte über Fortschritte der Anatomie und Physiologie"; "deutsche medicinische Wochenschrift" by P. Börner (1829–1885); "deutsche Zeitschrift für praktische Medicin" by Kunze, continued by B. Fränkel; "deutsches Archiv für Geschichte der Medicin und medic. Geographie", edited by Heinrich Rohlfs (and earlier in conjunction with Gerhard Rohlfs, the African traveller) etc. Among English journals we mention "The Medico-chirurgical Transactions, by the Medical and Chirurgical Society of London"; "Dublin Medical Transactions"; "Edinburgh Medical and Surgical Journal"; "The Medico-chirurgical Review"; "The London Medical and Surgical Journal"; "The Liverpool Medical Gazette"; "The Quarterly Medical Review"; "Guy's Hospital Reports"; "The Lancet"; "The London Medical Gazette"; "British and Foreign Medical Review"; "Dublin Medical Press"; "Medico chirurgical Review"; "Edinburgh New Philosophical Journal"; ["British Medical-Journal"; "Dublin Journal of Medical Science"; "Glasgow Medical Journal"; "London Medical Record"; "Braithwaite's Retrospect"; "The Practitioner" etc. — The earliest medical journal of the United States was the "New York Medical Repository" (1797–1824), of which mention has been already made. Next in order of time was the "Philadelphia Medical Museum" (1804–1811) edited by Dr. John Redman Coxe, which was followed almost immediately by the "Philadelphia Medical and Physical Journal" (1804–1809), edited by Dr. Benj. S. Barton. The "Baltimore Medical and Physical Recorder", edited by Dr. Tobias Watkins, appeared in 1808–9, and the "New England Journal of Medicine and Surgery" began its career as a quarterly in Boston in 1812. The latter journal in 1828 was consolidated with the "Boston Medical Intelligencer" and converted into a weekly under the title of "The Boston Medical and Surgical Journal", which continues to be one of our ablest medical periodicals at the present day. The earliest medical journal west of the Alleghany mountains was the "Western Quarterly Reporter of Medical, Surgical and Natural Science", which appeared at Cincinnati in 1822–23 under the editorship of John D. Godman. The "Journal de la Société Médicale de la Nouvelle Orleans", a quarterly which appeared in 1831, was the first medical journal published in the South, and the "Pacific Medical and Surgical Journal", which appeared in 1858, is the oldest of the existing medical periodicals of the Pacific coast (Billings). According to Dr. John S. Billings there were in the United States, in 1876, 46 regular medical journals, with 8 in Mexico and 7 in Canada. The more important of the existing medical periodicals of the United States are: "The American Journal of the Medical Sciences", which made its first appearance in 1820 under the title of the "Philadelphia Journal of the Medical and Physical Sciences", edited by Dr. Nathaniel Chapman. This, the *facile princeps* of American medical journalism, became in 1886 the recognized organ of American and English medicine, and with numerous and able collaborators in England adopted the additional title of "The International Journal of the Medical Sciences". Its present editors are Dr. I. Minis Hays of Philadelphia and Malcolm Morris, F. R. C. S., of London; "New York Medical Journal"; "New York Medical Record"; "Medical News" (Philadelphia); "The Medical Times"; "Boston Medical and Surgical Journal"; "Chicago Medical Journal and Examiner"; "Cincinnati Lancet and Clinic"; "St. Louis Medical and Surgical Journal"; "Maryland Medical Journal"; "New Orleans Medical and Surgical Journal"; "Louisville Medical News"; "Gailiard's Medical Journal"; "Journal of the American Medical Association"; "American Journal of Obstetrics"; "Virginia Medical Monthly"; "American Journal of Pharmacy"; "Archives of Ophthalmology"; "Archives of Otology"; "Archives of Pediatrics" etc.]. The "Medicinisch-Chirurgisches Correspondenzblatt" (monthly), edited by Dr. Marcell Hartwig of Buffalo, N. Y., was the first organ of the German physicians in the United States. [In 1886 the "New Yorker medizinische Presse", a monthly journal in the German language, appeared in New York under the editorship of Dr. G. W. Rachel.][1] — Among the French we may mention: the "Mémoires de la Société d' Emulation"; "Bulletins de la Société médicale d' Emulation"; "Annales cliniques de la Médecine de Montpellier"; "Mémoires et Bulletins de l' Académie de Médecine"; "Archives Générales de Médecine"; "Revue Médicale Française et Étrangère"; "Journal de Médecine et de Chirurgie Pratique"; "La Lancette Française"; "Journal Thérapeutique"; edited by Dr. Adolphe Gubler (born in Metz 1812, died 1879 in Toulon, Member of the Académie and at an earlier period physician to the Hôpital Beaujon), professor of therapeutics in Paris; "L' Union Médicale", edited by Amédée Latour (died 1882); "Gazette des Hôpitaux"; "Gazette Médicale" "Gazette Hebdomadaire de Médecine et de Chirurgie"; in Belgium "L' Abeille Médicale"; "L' Art Médicale" (Rud. Laussedat, died 1878); "Journal de Médecine de Bruxelles" (edited by Prof. van den Corput); in Russia the "Petersburger medicinische Zeitung" (edited for a long time by Heine's brother Maximilian, 1811–1878); in Spain "El Siglo Medico"; "El Genio Medico" (edited by Dr. Tejada y Espana, died 1886), etc. French journalism especially acquired a rank growth under the influence of the pathologico-anatomical school, so that since the thirties a genuine flood of medical periodicals has arisen, with the object of preserving the endless facts and experiments which have already been repeatedly published.

A peculiarity of the medical periodical literature of the present century, and indeed of scientific literature in general, is that in our age it is everywhere written in the national language, while the international Latin was far more commonly employed by savants and physicians even in the 18th century. The Latin language was preserved too in dissertations, at least in many universities, even beyond the middle of the present century.

By this general employment of the national language literary productions have been increased and facilitated, while the survey of the literature of other peoples has become rarer and more difficult, and the independent acquisition and enjoyment of such literature (so far as it is not obtainable by reports) have been comparatively diminished. The medical literature of individual peoples has lost its earlier international and universal character, and become, so to speak, more localized. Another not always beneficial (indeed, usually injurious) and often frivolous result of the general use of the national language and of printing, has been the appearance of

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1. Most of the journals mentioned will compare favorably with similar periodical literature of any other country. To many other of our journals Dr. Billings' application of the French criticism, "Il y a trop de tintamarre la dedans, trop de brouillamini", is both witty and wise. (H.)

innumerable so-called popular works on medical subjects. The deceptive daily advertisements of proprietary remedies are likewise to be looked upon as an outgrowth of the press.

As first during the 18th century in France, so also among other nations, and especially in Germany, there have reappeared in our century of specialism those literary associations which find their expression either in great compilations, published by many specialists, pursuing rather literary than practical aims, too comprehensive and detailed (and from the accumulation of material in the present day promising to continue), or in journals managed by the combined experts of one and the same department. To this class belong too the innumerable city and provincial societies, and the migratory assemblies of savants of all kinds.

The first "Wanderversammlung" of German naturalists and physicians was called into existence by Oken in 1822, and served as a model for all such institutions in other countries and on other occasions. Nowadays all branches of science (and even trades down to hatters and tailors) hold such "congresses"; indeed we have now an "International Congress" in the department of medicine. This German congress of savants, originally constituted under the idea of the unity of the practical sciences as a whole, has by degrees lapsed into the popular principle of the association of specialties and specialists, so that one branch after another has detached itself from the parent stem and pursued special objects in distinct "sections". Indeed some of these associations degenerate into mere cliques: "One man protects and supports another, because he is himself protected and supported by him. To most of them science is merely something by which they are enabled to make a living, and they deify even error, if from it they make their living" (Göthe). An association of the practising physicians of Germany, to pursue practical and social objects, under the direction of certain savants and doctrinaires, is in process of formation. The association of German physicians for the cultivation of public hygiene is already in possession of a very prosperous organization, for here the element of practical physicians proper has energetically assumed the initiative and has the preponderance.

[In no country of the world, probably, has the principle of medical "associations" been developed so widely and completely as in the United States. Besides the almost innumerable state and county medical societies, and the associations connected with our larger cities, there were in 1884–85 the following "National Medical Associations": The American Medical Association, organized 1847; American Pharmaceutical Association, 1852; American Ophthalmological Society, 1864; American Otological Society, 1868; American Neurological Association, 1875; Association of Medical Superintendents of American Institutions for the Insane; American Association for the Cure of Inebriates, 1870; American Public Health Association, 1872; American Gynecological Society, 1876; Association of Medical Officers of American Institutions for Idiotic and Feeble-Minded Persons, 1876; Association of American Medical Editors, 1869; Association of American Medical Colleges, 1876; American Dermatological Association, 1876; American Academy of Medicine, 1876; American Laryngological Association, 1878; American Surgical Association, 1879; National Association for the Protection of the Insane and the Prevention of Insanity, 1880; American Climatological Association, 1883. In the same year there were no less than 36 local medical societies in the city of New York alone. Without denying certain advantages connected with such a thorough division of medical labor in our larger cities, the tendency to the formation of petty cliques and the danger of running "specialism" to seed are very manifest. (H.)]

The German universities have decreased considerably in number during the present century. In 1800 the university of Ingolstadt was abolished and united with that of Landshut, which in 1827 was in turn removed to Munich. The university of Fulda ceased to exist in 1804, and the famous old university of Helmstädt in 1809. The university of Frankfort-on-the-Oder was in 1811 united with that of Breslau, while a year earlier the university of Berlin was newly founded. In 1816 the famous university of Wittenburg was united with that of Halle. The universities of Mayence and Altdorf died out. On the other hand the university of Bonn, abolished in 1792, was restored in 1818, the university of Dorpat was revived in 1802, and the university of Zürich was founded in 1833. Strassburg, after its restoration to its native land, was reorganized upon the German system in 1872 as the youngest of the German universities — it is in fact one of the oldest. The German universities of the present day, however, in contrast with those of the preceding century, have become almost universally mere places for the study of special branches, and for the acquisition of the knowledge absolutely requisite for securing a livelihood (Fach- und Brodstudiums), and the reputation of a savant frequently casts the calling of a teacher into the shade. They are no longer simple institutions of instruction, but serve likewise as places for investigation — a change which began to manifest itself as early as the 18th century. This peculiarity not infrequently works to the disadvantage of their educational aims. In all our universities too the clinical or practical side of medical education is largely cultivated, though least in operative measures. All are supplied with the necessary institutions and laboratories, which are open to the students.

Besides the institutions already mentioned, the university of Czernowitz was opened in 1875, and the oldest German university in Prague was divided into a German and a Czech department in 1882. A large number of German universities was also abolished, chiefly by Napoleon I.: Fünfkirchen (a German-speaking university, though located in Hungary), Bamberg, Olmütz (1853), Culm, Cologne, Erfurt, Treves, Dillingen, Paderborn, Rinteln, Salzburg (1810), Duisburg, Bützow, Herborn (1817, founded 1584), Lingen, most of them as we see, located in towns forming the residences of bishops. The cultivation of the sciences was injured thereby, although by the enlargement of the surviving institutions the professors gained in influence and income, a matter in which the representatives of the universities have taken a lively interest in our century. On the other hand, the French Faculties, abolished during the Revolution, were restored by Napoleon I. and Louis XVIII, but now five Faculties were established, the juristic, medical and theological, with the philosophical now divided into two, viz., the Faculty of letters and philology, poesy, geography, history, rhetoric and geology, and the Faculty of Sciences, to which were assigned the mathematical, mechanical and natural sciences, together with philosophy. In the year 1875 a retrograde movement towards the mediæval division of universities was made in France (as at an earlier period in Belgium), by the establishment of state and so-called free universities, the latter of which belong to the clergy and are similar in their influence and evil effects to the clerical universities of an earlier period. We see here again an exemplification of Buckle's remark, that, after great wars, the power of the priests always increases.

During the course of the present century the German universities have been all reorganized. The branches of natural science have been withdrawn from the medical professors and placed in the hands of special teachers. Gradually instruction in these branches has become obligatory upon physicians, and accordingly they have usurped the place of the earlier philosophical subjects of instruction, to the advantage of specialism and the injury of the general education of the students.

The subjects of medical instruction too have been multiplied (a process not yet entirely finished), and thus the theoretical education of students is presumed to be promoted. But at the same time the defective instruction in the natural sciences (physics, chemistry, botany, zoology, comparative anatomy, and for a long time also mineralogy) produces simply superficial learning, and often does more harm than good. In spite of the prolongation of the term of study (to 5 years), and in spite too of the fact that the clinical system of instruction is everywhere introduced, practical education on leaving our universities is trifling, for, as we know, the students in a few places only, before entering upon their practical career, are enabled to learn upon the living patient how to perform any operative procedure whatsoever. And as long as the final examinations are not assigned in each country to boards of examination independent of the universities, the free choice of his teacher, so very important, indeed, so essential to the practical formation of the future physician, and the actual liberty of removal, are lacking, although, from the degradation of physicians to the level of "tradesmen", both these deficiencies must be expected. The last measure, however, imperfect and unjust as it is, seems in the light of all historical experience, destined necessarily to exercise the worst influence upon medical studies and professional standing. The same may be said of the testimonium required by the universities, which no longer, as heretofore, entitles a classical education only to the study of medicine, since a practical school education is now sufficient for this purpose. We say nothing of the authorization of female students of medicine, already effected in other countries and commented upon favorably by some of our German teachers.

[According to Dr. John S. Billings, there had been chartered in the United States up to the year 1876 no less than 84 medical schools, of which 59 were still in operation at that date. The more important of these schools (omitting those founded during the 18th century, which have been already mentioned), with the year when their first diplomas were awarded, are as follows: Medical Department of the University of Maryland, 1811; Medical Department of Yale College, 1814; Bowdoin College and Medical School of Maine (Brunswick), 1821; Medical School of the State of South Carolina (Charleston), 1825; Jefferson Medical College (Philadelphia), 1826; Medical College of Georgia (Augusta), 1833; Medical Department of the University of Louisiana (New Orleans), 1835; Medical Department of the University of Louisville, 1838; Albany Medical College, 1839; Medical College of Virginia (Richmond), 1839; Medical Dept. of the University of the City of New York, 1842; St. Louis Medical College, 1843; Rush Medical College (Med. Dept. Univ. Chicago), Chicago, 1844; Medical College of Ohio (Cincinnati), 1821; Cleveland Medical College, 1844; Med. Dept. of the University of Michigan (Ann Arbor), 1851; Med. Dept. of the University of Nashville, 1852; Bellevue Hospital Medical College (New York City), 1862. The average production of the medical colleges of the United States in the seven years 1870–1876 was 2,100 "doctors" per annum. The vast majority of our medical schools are entirely disconnected from any other institutions of learning, though a few preserve a nominal connexion with certain "universities" or "colleges". They are merely voluntary associations, receiving no aid from state or municipal authorities, rarely possessed of any endowment, and depending for their support upon the fees of their students. As a rule nothing more than a fair common-school education is required as a preliminary to matriculation, though recently the Medical Department of Harvard University has adopted a somewhat more thorough preliminary examination and a graded course, with the anticipated result of perceptibly diminishing the quantity, and perceptibly improving the quality of its medical students.[1] The final examinations are everywhere in the hands of the professors, and the traditional terrors of the "green room" exist more in anticipation than in reality. The usual term of study required for graduation is three years. Of the natural sciences chemistry (superficially) and more rarely botany alone are taught. In many of our medical schools clinical instruction is merely nominal, though in the large cities very good facilities for practical education are afforded.

The practical results of our present system of medical instruction naturally vary largely in different institutions. In all of them the *theoretical* education of the student is inferior to that imparted by the European universities. *Practically*, however, the conscientious graduates of our larger metropolitan colleges are probably quite as competent to cope with disease as any of their more highly (i. e. theoretically) educated European colleagues. In many of the smaller colleges the results are, of course, far less successful, and the new-fledged "doctor" is here turned loose upon the world to gain by experience what he failed to acquire from the somewhat ill-supplied bosom of his alma mater. Within the last few years, however, the establishment of "policlinical" or "post-graduate" medical schools[2] in many of our large cities has done much to supplement the deficiencies of our minor institutions for medical instruction, and with the increasing development of the country and the rapid extension of facilities of communication, it may be reasonably expected that many of our ill-supplied and ill-supported medical schools will gradually disappear before the inexorable demands of the Darwinian law. There is genuine comfort too in the reflection with which Dr. Billings concludes his admirable sketch of the history of American "Literature and Institutions" during the first century of our Republic. "We have no reason to boast, or to be ashamed of what we have thus far accomplished . . . and we may begin the new century in the hope and belief that to us applies the bright side of the maxim of Cousin: 'It is better to have a future than a past'." H.]

2. SYSTEMS, THEORIES AND SCHOOLS OF THE NINETEENTH CENTURY.

From the history of every century, and especially from the history of medicine, we may draw the experience that the representatives of any epoch always regard it as certain that they have trodden the very best paths to attain the knowledge of the truth; they even incline to the assumption that they alone are in possession of the highest attainable science and of the best methods of investigation, indeed, often of the truth itself. In this they doubtless affirm nothing more than the principle of evolution, in virtue of which the living and the present, in contrast to the past, place themselves in the forefront of the right. But even the present is, of course, only a phase of the general development of culture, upon which is imposed always those limitations and errors which have ever existed for and in the development of the sciences, as in that of humanity. That this is quite true for the present century also, and especially for its medical culture, its history has already demonstrated. It is no more free from error than the earlier centuries, and, indeed, even surpasses them in the monstrosity of its medical doctrines. In this connexion we may merely mention, by anticipation, homœopathy, Rademacherism, ideal pathology, isopathy etc., all of them phenomena of our century, so boastful of its superiority. The changes of systems, theories, hypotheses — Goethe calls the latter lullabies with which teachers lull their pupils to sleep — and methods of thought constantly recur so long as medicine exists, and are the expression of every tendency of culture and of the bent of every age — but they are not the truth. Hence they are for the most part maintained only during their period of florescence. And we too at the present day, in spite of the universal domination of the analytic method, are not exempt from these expressions, and daily experience that the hypotheses of the time are regarded almost as so many truths, while we have accustomed ourselves to condemn only the theories of the past.

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[1] The example of Harvard has also already borne fruit in several other schools, and the demand for improvement in medical education is becoming daily more and more importunate. (H.)

[2] Of these the earliest was the "New York Polyclinic", organized in 1880-81 and opened in 1882. A similar institution was opened in Philadelphia in 1883, and policlinical schools are now to be found in most of our large cities. Instruction in these schools is imparted only to possessors of the diploma of M. B. or M. D. (H.

"As regards the stand-point of theoretic medicine no one will be deceived. . . . The art of experimenting produces instruments, but a collection of experiments is never made a science by instruments. . . . Building material is there in abundance, so that we can scarcely see the ground upon which the structure is to stand, but the foremen are disputing and uncertain about the plan. . . . Indeed, we are led to think that, among the sciences which have for their subject the knowledge of nature and her forces, medicine assumes the lowest place. . . . What lies very close to fancy is employed as a bridge; if we come safely over it, we let it fall into ruin behind us, instead of giving it a secure and permanent foundation; if it fails to support us, we lay the blame upon the imperfection of the science" (Liebig). To us the following criticism seems also of value: "Our surgery in 2000 years has made brilliant advances; the special science which considers the internal relations of the body, into which the human eye cannot look, has made none; we stand face to face with the same enigmas as did our forefathers" (Bismarck).

The systems of an earlier day were longer-lived; we need recall but those of the Dogmatists and of Galen. In modern times they are becoming more ephemeral. While the systems of Theophrastus, of the Iatrochemists and the Iatro-physicists lasted, on the average, a century, the most highly prized systems of the 18th century endured scarcely more than a quarter of this period. Indeed, many of our own day scarcely last more than a couple of decennia, and are outstripped only by the revolutions in therapeutic methods, so that Gutzkow could say "Medical men devise new systems every day".

So long as the final cause and the forces of life itself, healthy as well as diseased, are unknown — and in truth this will always be the case, for here the maxim of Marcus Aurelius, *ὅτι πᾶν ὑπόληψις*, ever holds good —

so long will medicine be compelled to occupy itself, as it has done for thousands of years, with the changes of hypotheses and theories. Much error and little truth is here again the lot of humanity. Systems, theories and methods of investigation, however, disappear like the races from which they spring; things alone remain ever the same, and concerning these, systems busy themselves, and over them they dispute in the course of the history of culture, with methods constantly changing, yet from time to time recurring to some earlier path. Ideas about things, and the methods of expressing these ideas, separate and distinguish characteristically the different epochs of civilization. What the struggling present considers the highest point ever attainable, or perhaps only thus far attained, this the history of the future may readily disregard, as it has done with so many similar views of the past. The phases of development of humanity in history are various. Humanity itself and its essence alone remain unchanged. The latter is uninterrupted development to an object and end for us inscrutable, but which, at all events, excludes the possession of complete truth. For, according to the profound maxim of Lessing, only the struggle for the truth is the portion of humanity. History, however, is the only mirror in which we can and must regard the present, with its systems and methods.

THE SYSTEMS, THEORIES AND SCHOOLS

of the 19th century, at least a considerable portion of them, are rooted in the soil of the 18th century, which was so fertile in such phenomena. Indeed their cradle was often placed in the later years of the latter century. Such was preeminently the case with the so-called

a. Theory of Excitement,

a simple modification of, or if you will, an improvement upon, Brunonianism. Its founder was the highly intellectual

JOHANN ANDREAS ROESCHLAUB (1768–1835).

He was born in Lichtenfels, near Bamberg, and was originally a student of theology before devoting himself to medicine in Bamberg and Würzburg. Graduating at the age of 27 years, he was made in the same year extraordinary professor, and in 1798 ordinary professor in Bamberg, and physician to the hospital in that place under Marcus. Thence he was called in 1802 to Landshut, and, after the abolishment of that university, to Munich. In 1824 he was pensioned, and in 1834 got rid of by the grant of the title of "Hofrath", in place of the position of medical counsellor which he had enjoyed since 1804. His chief works were: "Untersuchungen über Pathogenie, oder Einleitung in die Heilkunde" 1798–1800, 3 vols.; "Lehrbuch der Nosologie", 1801; "Magazin für Vervollkommnung der theoretischen und praktischen Heilkunde". The latter journal, published from 1799, had originally many collaborators, but lost them through Roeschlaub's quarrelsomeness, so that he finally stood alone and the journal collapsed in 1803; "Erster Entwurf eines Lehrbuchs der allgemeinen Iaterie und ihrer Propädeutik", 1804; "Lehrbuch der besondern Nosologie, Iatreusiologie und Iaterie", 1807.

The doctrine of excitement was a theory of solidism, a doctrine which "endeavored to mould into one the errors of Brown and the fancies of Schelling." According to this theory, life depends upon irritability, which, however, is inherent in the organism as an independent capacity. Thus two things, irritability and organization, are taken into consideration, while Brown recognized the former alone. Life also is a condition not only enforced from without, but also springing from within. Excitability, on its part, is divided into susceptibility to irritation and reaction against it. These two in fact represent one principle only, but are to be distinguished in idea. The grade of irritability determines the condition and behavior of the body. Bodily health consists in moderate irritation and moderate excitability. Qualitative alterations of parts, accordingly, are not taken into consideration. Disease, on the contrary, is either a deviation from that medium condition upwards = hypersthenia (instead of Brown's sthenia), or downwards = asthenia, or a disproportion between irritation and excitability. Asthenia again is divided into direct — absolutely — or indirect — relatively — too slight irritation, and a condition consisting in a combination of both. The second variety is, for the most part, a sequela of hypersthenia. The highest grades of asthenia are causes of death. There is no such thing as disease of the fluids of the body, though there is a corruption of these. This Roeschlaub endeavors to prove as follows:

> "That body only can be called organic, which has the capacity, of its own independent activity, to administer certain functions. To administer a function in this way it is necessary that such a substance shall possess the capacity to generate active motions of its parts. Now fluid substances are those whose constituent parts are movable upon each other by any, never so slight, motive force, are simply capable of suffering passive motions. Hence rigid bodies alone can generate active motions, while disease, as a condition of the organism, must be determined from all or certain of its parts. The fluids, however, as not organic, cannot be called parts of the organism. Hence the name of disease cannot be applied to the changes which arise in the fluids of the organism." (See Rohlfs.)

Besides disease, there is an "indisposition", which has for its object not the organism, but the functions.

Roeschlaub too is one of the first who taught in Germany that "Disease is not the opposite of health, and that the limits arbitrarily drawn between pathology and physiology must be swept away." This definition was subsequently adopted especially by Henle and Virchow, and was looked upon as new, though it was not really so.

To his original theory Roeschlaub subsequently added a chemical or qualitative potency, oxygen, so as not to avoid entirely the alterations of quality. In his further course he inclined towards natural philosophy, then to mysticism and theosophy, and finally made the confession — for once an honest Systematist — that he had been mistaken in his whole theory. In this position of honesty he stands almost alone, but furnishes undeniable evidence of great penetration and moral power.

Roeschlaub laid down, as the quintessence of his doctrine, thirty so-called laws of excitability:

1. Without an irritant there is no irritation.
2. Without irritation no excitement.
3. Without irritability no irritation and likewise no excitement.
4. Without irritability no vital function.
5. Irritation stands and falls with the irritant.
6. Equally powerful irritants occasion greater irritation the greater the excitability.
7. The greater the excitability, so much the less may be the irritant to produce considerable excitement and conversely.
8. Every irritation diminishes excitability etc.

—distinctions in which, from the standpoint of our present knowledge, we can recognize nothing but simple ingenuity.

The number, as well as the intellectual importance, of the followers of the theory of excitement was considerable. Still the adhesion of many was brief. Among others the adhesion was not pure, i. e. their own ideas, those of the humoral pathology, of natural philosophy, or the doctrines of Reil etc., were united with those of Roeschlaub. The most memorable of the partisans of Roeschlaub's system were: the prematurely deceased and talented

LUD. H. C. NIEMEYER (1775–1800; Materialien zur Erregungstheorie etc., 1800);

KURT SPRENGEL. The best known partisan of the theory of excitement was

ADALBERT FRIEDRICH MARCUS (1753–1816) of Arolsen,

a physician in Bamberg after 1778 and ordinary physician of the prince-bishop. Though a Jew by birth, he became a teacher in 1795 and finally director of the "Schule für Leibarzte". Subsequently he became one of the first partisans of the natural philosophical school, and finally a devotee of the theory of inflammation, a forerunner of Bouillaud, who treated and maltreated with bleeding everything and everybody.

A. L. ERNST HORN (1774–1848) of Brunswick,

where he taught after 1802, subsequently a teacher in Wittenberg and Erlangen, and finally, after the founding of the university, in Berlin, was an eminent university professor. "Horn's Archiv" was for a long time an influential organ.

FRIEDR. WILH. VON HOVEN (1760–1838) of Ludwigsburg,

the home of many eminent men, a friend of the regimental physician Schiller[1] of the "Karlschule" here, for a long time professor in Würzburg, and subsequently medical counsellor in Ansbach and Nuremberg.

ADOLPH CHRIST. HEINRICH HENKE (1775–1845), professor of legal medicine in Erlangen; the historian A. F. Hecker, L. J. K. Mende, the first and last eminent teachers of state-medicine; J. H. Müller ("System der gesammten Heilkunde nach der Erregungstheorie", 4 vols.); Ludwig Christ. Wilhelm Cappel (1771–1803), professor in Göttingen; the learned, and in his day highly esteemed, Joh. Wilhelm Heinrich Conradi (1780–

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[1] His monthly salary was 30.80 marks ($7.39).

1861) of Marburg, professor in that city, in Heidelberg and after 1823 in Göttingen ("Beiträge zur Erregungstheorie, 1802"; "Grundriss der Pathologie und Therapie"; medical encyclopædia and methodology, both reprinted several times, etc.); J. Jos. Doemling, professor in Würzburg, Eschenmayer and many others.

The practitioners and eclectics especially were important opponents of the theory of excitement. At their head we may place the Lessing of medicine,

JOHANN STIEGLITZ (1767–1840) of Arolsen, one of the clearest and calmest of minds, an eminent and highly esteemed physician and the founder of etiological diagnosis.

Stieglitz had studied in Göttingen, afterwards settled in Hanover, where in 1802 he was appointed court-physician, in 1806 physician-in-ordinary, in 1820 "Hofrath", and died in the offices of medical counsellor and president of the medical board.

Besides Brunonianism, including the theory of excitement, Stieglitz with great sagacity, calmness and dexterity also opposed homœopathy and animal magnetism. Regarding the former, i. e. the theory of excitement, he said: "It is not surprising that absolutely nothing is cleared up, and that practical knowledge is neither enriched nor improved by these Brunonian refinements. There is no such thing as one only saving system!" Such was his judgment on theories in general! — Towards the end the politic, ingenious and "diplomatic"

CHRIST. WILHELM VON HUFELAND (1762–1836) of Langensalza; son of a physician in Weimar, also entered the lists in opposition to the theory of excitement.

Hufeland was originally a practitioner in Weimar, then became professor in Jena and finally in Berlin. In the latter city he was made state-counsellor, became a very popular physician and was finally appointed physician-in-ordinary. He was one of the most famous physicians of his time, and has remained known to a wide circle down to the present day, particularly through his "Makrobiotik". In science he always, with the best of intentions, filled the rôle of a mediator, but was thus brought into conflict with almost all theorists, and yet by the aid of his powerful "Bibliothek" and his "Journal", his firmness and consistency, he was enabled to control the disputants. He was one of the busiest of practitioners and a very fruitful author.

He wrote: "To him who fails to make a religion of the healing art it is the most cheerless, wearisome and thankless art upon earth; indeed, in him it must become the greatest frivolity and a sin. . . And what is it with many? Nothing but a simple speculation, a means for making a fortune, for acquiring wealth and honor, at most among the better minds a system of investigating nature!" The latter, according to the programme of the "natural scientific school", is its position at the present day.—"Hufeland belonged to those mediatorial natures, who, without being very productive themselves, possess the gift of modesty, of recognizing the services of others, and yet have talent enough of their own not to stand in the shade. He had a noble, warm and most benevolent heart." (Kohlrausch, "Erinnerungen.") Hufeland also possessed strong penetration, as is shown by his saying: "Successful treatment requires only one third science and two thirds of savoir faire."

Christian Heinrich Pfaff (1773-1852) of Stuttgart,

a pupil of the "Karlschule" (like his countryman G. F. Jaeger, 1785–1866, the father of the speculative "Discoverer of the soul", which was supposed to manifest itself by evil exhalations), from 1797 a professor in Kiel ("J. Brown's System der Heilkunde", "Revision der Grundsatze des Brown'schen Systems" etc.).

Phil. Karl Hartmann (1773-1830) of Heiligenstadt,

professor of general pathology in Vienna and a famous teacher ("Analyse des Brown'schen Systems", "Theorie der Krankheit").

Alexander von Humboldt. The eminent

Friedrich Ludwig Kreysig (1770-1839),

first professor in Wittenberg, where he founded an ambulatory clinic, then physician-in-ordinary and professor in Dresden ("System der prakt. Heilkunde", "Krankheiten des Herzens"). Kreysig first demonstrated endocarditis (long before Bouillaud) and was acquainted with defects of the cardiac valves, though not with their diagnosis, inasmuch as he was not in possession of auscultation. The so-called "purring tremor" (frémissement cataire) was also known to him before Laennec, and he likewise recognized rheumatism as a cause of diseases of the heart (before Bouillaud). — Also the ingenious, but eccentric

Karl Jos. Windischmann (1775-1839) of Mayence,

who, in consonance with his course of study, was sometimes professor of philosophy, sometimes of medicine, and for a long time physician-in-ordinary of the elector of Mayence in Aschaffenburg, belonged among the opponents of the theory of excitement. He embraced Mesmerism, and desired to reunite religion and medicine in their original relations,[1] while in deep Catholic faith (the "fashion" in this day of romance, and adopted even by many Protestants of that time) he regarded mental diseases as results of Adam's sin etc. Originally one of the Illuminati and a Freemason, he became a follower of Schelling and a Romancist[2] who discussed the historical development of medicine romantically and ingeniously, but not very profoundly. His chief title to fame must rest upon the fact that he was the teacher and patron of Franz Bopp, the son of the elector's commissary and the creator of comparative grammar and the science of language.

Wenzel Aloys Stütz (1772-1806), a physician at Gmünd in Swabia,

still known for his treatment of tetanus with opium, nitrate of potash internally and potash baths, and the peripatetic, ingenious

Georg Christian Gottlieb, baron Wedekind (1761-1831), of Göttingen,

professor in Mayence and then ordinary physician of Ludwig I. in Darmstadt, also an opponent of homœopathy, as well as

Christ. Gottfried Gruner in Jena,

and many other physicians who still belonged entirely to the spirit of the 18th century, were opponents of the theory of excitement.

A far worse offshoot of the Brunonian theory, absolutely baleful in its application to practice, was the so-called "New Italian Theory" of

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[1] Like Ringseis, who expected remarkable advantages for the sick from this source.

[2] The German "Romantiker" is a follower of mediæval taste in art and literature. (H.)

b. Stimolo and Contrastimolo,

which had for its author Giovanni Rasori (1762–1837) of Milan. This was a genuine blot upon the healing art beyond any other of the various systems, however strongly the same charge might be made also against the latter. In this we see again that long centuries of experience and the venerable conclusions of great minds may at times be utterly lost to posterity, and in times too which believe they may boast of the highest intelligence. And poor, sick humanity must ever supply the material of investigation for such theoretical systems (constructed, we may admit, with the best of intentions) and for the therapeutics based thereupon! Far worse too than the theories and hypotheses themselves are in this case the methods of treatment founded upon them, though fortunately such has been the fact with comparatively few systems. Among these few positively dangerous systems belonged, however, as the following examples will show, the theory of stimolo and contrastimolo.

Rasori had studied medicine in Parma, his native city, and in the neighboring Pisa. He then adopted in England the Brunonian theory, and after practising for a time in Milan, taught this theory in his lectures as a professor in Pavia, a position which he did not long occupy. After the transformation of Upper Italy into the so-called Cisalpine Republic he occupied a high administrative position in Milan, from which he was called in 1800 to devote his attention to an epidemic of typhus, which had broken out in Genoa On this occasion he found such bad results from the Brunonian treatment that he abandoned it and invented his own theory, which, as chief of a clinic in Milan in 1807, he then zealously supported, though only in his lectures and minor writings. After Upper Italy fell into the possession of Austria, Rasori was kept in prison for four years, but was then restored to his position at Milan, and retained it until his death. The chief work upon his theory was entitled "Della nuova dottrina medica Italiana. Prolusione alle lezioni di clinica medica nella P. Universita di Bologna per l' anno 1816–17 del Professore Giacomo Tommasini. Firenze, 1817."—Rasori himself first published his views in his translation (1803) of Erasmus Darwin's "Zoonomia". It was, however, his numerous pupils in Italy who chiefly diffused his doctrines in writings.—In Germany the Rasorian theory was introduced to notice by W. Wagner in his "Kritische Darstellung der Lehre vom Contrastimulus. Berlin, 1819."

On the whole, the doctrine of Rasori too is merely a new edition of the system of the Methodists, so often set forth, only it had deteriorated in practice.

Rasori assumes a diathesis di stimolo (diathesis sthenica of Brown, status strictus of the Methodists) and a diathesis di contrastimolo (diathesis asthenica of Brown, status laxus of the Methodists), but, in contrast to Brown, teaches that the diathesis di stimolo is the most frequent. To this he adds (again differing from Brown) a local stimulation, which passes over into a general diathesis, a diathesis di stimolo, unless it is speedily removed. In the diathesis di stimolo the organic fibre is irritated and contracted. The symptoms of this condition are, among others, spasms, contracted and quick pulse, active delirium etc., while in the cadaver are found a contracted and bloodless heart, and tense, deep-red muscles. In the diathesis di contrastimolo on section we find the heart filled with blood, together with paleness and flaccidity of its fibres, and as symptoms during life, relaxation of the organic fibres, a weak pulse, ringing in the ears, quiet delirium, anxiety, sopor. Pain, tetanus, constipation, mucus- and worm fever are to be considered expressions of local irritation.

The diagnosis of these diatheses, singularly enough, cannot be made from the symptoms, but solely from the remedies which benefit them or make them worse, a doctrine similar to that of Rademacher, though the latter from the efficacy of his remedial agents reasoned back to the diseases named after them.

There are external and internal irritants. Among the latter belongs the blood, which is likewise the most general irritant, while among counter-irritants are classed, lymph, bile, urine, gastric juice etc.

Venesection is to be regarded as the most reliable diagnostic means. If it is beneficial, the diathesis di stimolo is present and remedies may be selected accordingly. For the attainment of the diagnosis, however, venesection should not be practised more than twice. If this measure proves injurious, the diathesis di contrastimolo exists.

All remedies which act in accord with a venesection which has proved beneficial are likewise suitable to oppose the stimolo. Among these contrastimulants belong musk, alcohol, camphor, cinchona, opium, ethereal oil, ammonia etc. On the other hand, among the stimulants are aconite, nux vomica, belladonna, coffee, tea, digitalis, chamomile, iron, jalap, gamboge, ipecac, castoreum etc. — The individual remedies in both these classes are of equal value, though a few among them have an eminently specific action upon special organs, so that e. g. digitalis acts upon the heart, belladonna upon the brain and vessels etc. If, however, a remedy acts too powerfully, in other words if the irritant acts less powerfully than the irritation of the remedy, this fact is shown by the unfavorable action of the drug. If e. g. the contrastimulus of the drug is stronger than the irritation, pain in the stomach, vomiting etc. occur. — Huge doses of medicine were often administered, as e. g. 1. 4 grammes of gamboge for diarrhœa, 60–90 grammes of saltpeter per diem etc.

Diseases are divided into:

1. Infectious diseases with the diathesis e stimolo, e. g. syphilis, itch etc.;
2. Epidemic diseases arising from miasm, e. g. diarrhœa, typhus;
3. Hereditary diseases, e. g. phthisis, scrofula, epilepsy;
4. Diseases arising from accidental causes.

The following clinical histories will serve to show how patients were "treated" in accordance with this theory:

SYPHILIS.

"Giuseppina Vigano of Bassera, aged 27, stoutly built, has hitherto enjoyed the best of health. She came to the clinic on Aug. 3, fearing that the syphilitic child which she was nursing had infected her. Facies good and gives evidence of health, the remainder of the skin somewhat pale, appetite, pulse and all the functions normal, the nipples on both sides slightly sore, small ulcers upon the child's lips. Ordered spare diet, a pound and a half of wheaten bread and two eggs per diem. Aug. 4: extractum aconiti et pulv. herb. aconiti aa 8 grammes (in the original the old medical weights are employed) in 12 pills. — Aug. 5: general condition unchanged, the same medication. — Aug. 6: general condition the same. Ordered — extract. aconiti et herb. aconiti aa 12 grammes.--Aug. 7: the local trouble continues, general condition the same: extract. aconiti 15 grammes. — Aug. 8: appetite impaired, skin and eyes somewhat yellow: ext. aconiti 24 grammes.—Aug. 9: jaundice more apparent: ext. aconiti 30 grammes. - August 10: melanicterus, vomiting, pain in the stomach, loss of appetite, the unfortunate patient is forced to keep her bed: ext. aconiti 30 grammes. —August 11: nausea has persisted during the past night, vomiting and delirium make their appearance, vision is reported disturbed, voice husky and weak: ext. aconiti 15 grammes. — August 12: has had a very restless night, patient tormented with great suffering, left her bed and could not get back again without help. The medicine is (at last!) suspended and nothing is administered. Towards evening voiceless, soporose, closed eyes, trismus, convulsions, dyspnœa, very rapid, irregular pulse, dry, harsh skin. Ordered — venesection to one pint (!). August 13: body less jaundiced, but the other symptoms aggravated. Belly distended, the blood drawn yesterday has a soft, yellow coating. ·Venesection repeated, barley-water with (once more!) 0.35 grammes of tartar-emetic and two enemata, containing each 1 4 grammes of tartar-emetic. — Towards evening condition worse: (nevertheless) a venesection of one pint. — August 24: soporose condition persists, respiration still (!) difficult, ronchus. Barley-water and tartar-emetic are prepared but — the unfortunate patient died towards evening" --systematically poisoned (134 grammes of ext. aconiti in seven days!) to remove a disease which would probably have got well without any medical aid!

PERIPNEUMONIA.

"Steffano Cananzi, aged 20, of melancholic constitution, never before sick, except two months ago a tertian fever, which disappeared after the 7th accession. On May 23 towards evening had a heavy chill, followed by high fever and headache. May 24: venesection performed at the patient's house. A mucilaginous decoction ordered. May 25 and 26: condition unchanged. The fever manifests remissions. Pains continue. May 27: the patient taken to the clinic. Face pale, skin dry and harsh, pulse tense and hard, pain in the chest, increased by coughing, still little expectoration. May 28: restless last night in consequence of his cough, the other conditions unchanged, urine scanty and full of sediment. Ordered a venesection of about 18 ounces, tartar-emetic 1.1 grammes. Towards evening another venesection of 18 ounces. May 29: all the symptoms worse, expectoration scanty, diarrhœa but no vomiting, complains of great weakness, pulse hard and contracted. Ordered venesection of 18 ounces, tartar-emetic 1.2 grammes. Towards evening another venesection of 18 ounces. May 30: Weakness increased, mournful look (quite credible!), small pulse, persistent, dry cough, obstinate diarrhœa. Venesection of 18 ounces, tartar-emetic 1.2 grammes. Towards evening another venesection of 18 ounces. May 31: sleepless night, very great weakness, quiet delirium, subsultus tendinum, groaning respiration, incontinence of urine and fæces. Venesection and tartar emetic repeated as before."—About seven o'clock in the evening the unfortunate patient "breathed forth his soul", for in four days he had lost about nine pints of blood and taken 4.4 grammes of tartar-emetic.

These two clinical histories, even were they only exceptional, condemn the system more loudly than all words. For this is no longer a "system", but systematic murder under the infatuation of a theory. While we read the sympathetic epitaph "the unhappy patient died", or "the unfortunate patient breathed forth his soul", a feeling of oppression comes over every sensitive nature — a feeling too not removed by the good results in the following case, for here too the treatment is undoubtedly irresponsible for the fortunate termination.

Rheumatic Fever.

"A young man, aged 20 years, who five days before had been discharged from a hospital into which he had been taken for a slight pneumonia had not been free from fever since the day of his discharge, and also suffered dragging pains in the muscles, especially those of the calf of the legs. He was accordingly received into the clinic, where he had come, upon August 3d. He had a quick and contracted pulse, burning thirst, and cough without pain. August 4: the same symptoms, sputa streaked with blood. Ordered 1.1 grammes of pulv. digitalis. Aug. 5: pulse 116 beats per minute, palpitation of the heart . Digitalis 1.7 grammes. Aug. 6: pulse less frequent and contracted, general heat somewhat diminished, palpitation, no cough. Ordered pulv. digitalis 2.1 grammes. Aug. 7: epistaxis, arterial pulse somewhat irregular and less frequent than yesterday, pupils dilated. Pulv. digitalis 0.6 grammes. Aug. 8: pulse less frequent than yesterday and very irregular (5.5 grammes of digitalis had been given in four days). Medicine discontinued. Aug. 9: pulse scarcely 30 per minute (!). In other respects the patient is doing tolerably well. Aug. 10–14: the patient feels well, but the irregularity and infrequency of the pulse continue. Aug. 15: the fever has returned with excessive chilliness and heat; pulse more frequent than usual; no passage from the bowels for two days. Ordered cambogiæ 0.3 grammes. Vomiting soon follows its administration. At evening 0.3 grammes of Kermes mineral. Aug. 16: sixteen movements of the bowels in 24 hours. Some fever remains and the pains, which had disappeared for a few days, have returned. Simple emulsion. Aug. 18: the muscular pains continue; manifest return of fever; 12 movements of the bowels. Ordered one pint of wine. Aug. 19: the diarrhœa and pains have ceased. One pint of wine. Aug. 20: no fever, no pain. No medicine administered. The patient is soon discharged cured."

This clinical history too was taken in 1825 in the "Spedale Maggiore" at Milan. The digitalis poisoning in this case, in contrast to those before quoted, terminated without serious results (See Schlesinger).

Among the inconceivably numerous and eminent followers of the doctrine of Rasori, some of whom, in spite of the therapeutic atrocities already pointed out, were able by the help of statistics to report favorable results, we should mention: Syro Borda, professor in Pavia; Vincenzio Lanza, grandfather of the physician and eminent statesman Giov. Lanza (1815–1882); Bondioli; the famous Valer. Luigi Brera (1772–1840), successively a physician in Milan, professor in Pavia, Padua, and Bologna, and finally a physician in Venice; Enrico Acerbi (1785–1827), professor in Milan; Bassiano Carminati of Lodi, professor in Pavia; Giov. Antonio Fossati (1786–1852) and others. — Among the opponents of this doctrine were J. A. F. Ozanam, a famous epidemiologist, who rejected as absolute folly the doctrine of a contagium animatum which originated in the 17th and 18th centuries (Loeffler); Giov. Batt. Spallanzani, physicus and a physician in Reggio: Federigo Carpo in Venice; Geromini; Giuseppe Agostino

Amoretti, professor in Turin (1816); Maurizio Bufalini (1787–1861), professor in Florence, and numerous others. Emiliani, Guani and Robini were partial adherents of the theory of Rasori, while Francesco Puccinotti (1794–1872) in Pisa displayed more independence.

After the doctrine of Rasori had run its course, there also began in Italy a powerful revival, to which a part of the professors of the French school of pathological anatomy, and a still larger portion of the Prague-Vienna school, united themselves. In the latter party belong, above all, Arnaldo Cantani (born at Hainsbach in Bohemia in 1837), since 1868 a professor in Naples, translator of Niemeyer's "Lehrbuch", author of a work on diabetes etc., and Salvatore Tommasi and Tanturri, both also professors in Naples; Tommasi-Crudeli, a pupil of Virchow, in Rome; Guido Baccelli, in 1881 Italian Minister of Instruction; Achille Bianchi (died 1876) of the "Ospedale San Spirito"; Brunelli, an electrotherapeutist; Magni (oculist) etc.

Puccinotti, Salvatore di Renzi (1800–1872), and Alfonso Corradi (epidemiographer) distinguished themselves as medical historians.

The political revival of Italy matured also a revival of Italian medicine, and as Germany assisted in paving the way for the former, so also she exercised a controlling influence upon the latter, thus returning in our own century the impulse which she had herself received from Italy in the 16th and 17th centuries.

The relative importance of the Italian universities may be judged from the following estimate of the number of their students in 1877. Naples 2435, Turin 1234, Padua 974, Pavia 652, Rome 559, Bologna 511, Pisa 470, Genoa 388, Palermo 333, Modena 223, Catania 152, Siena 141, Messina 79, Cagliari 54, Macerata 52 — altogether 8441 students against 18,000 in Germany.

If, according to Rasori's theory, the chief task of the physician consisted in discovering the "diathesis" upon which so-called methods of treatment of objectionable energy might be based, in the Hahnemannism, preached up at the present day with more energy than for many years, and which as the so-called

c. Homœopathy

opposes itself to "Allopathy" (a false catch-word devised by the homœopathists), there prevails a system of therapeutics still more inconceivable in principle, but which is, at all events, less dangerous in practice than that of Rasori. We might even call this system entirely innocent, were there not in the treatment of the sick sins of omission as well as of commission. Instead of tentative venesection of the patient, the action of drugs upon the healthy becomes the guide for the selection of remedies. Accordingly, for the removal of a given congeries of symptoms — there are no diseases, but merely their symptoms, which are to be regarded as signs of an injury to the vital force — that remedy must be selected, which, when administered to the healthy, has produced the same, or at least a similar, group of symptoms. The artificial form of disease produced by such a remedy then expels the natural, but weaker disease. This system of therapeutics thus follows the Old Testament maxim that like is to be returned, or banished by like. The most thorough knowledge of the effects of drugs upon the healthy body, and an extremely careful comparison of the phenomena thus produced with the symptoms of disease in any given case, are absolutely necessary to the physician. In this way the best remedy must infallibly be discovered, and, still better, patients at a distance need not be deprived of the benefits of homœopathic treatment, since the symptoms may be imparted by letter. The physician then combats the disease on the principle "Similia similibus curantur", instead of proceeding according to the allopathic maxim "Contraria contrariis", but attains the same result as the allopathic physician and far more certainly. For the homœopath acts with a complete consciousness of what he is doing, while the allopath at last can meet with good results only when, wandering unconsciously and accidentally into homœopathic paths, he lights upon the right course. By this course of reasoning "allopathic" and natural cures are deprived of their inconvenient powers of demonstration against homœopathy. It must not, however, be overlooked that the simplest remedies are administered in the utmost possible dilution. Only in their preparation, and before administration, they must be strongly shaken or triturated, since thereby their efficacy is infinitely increased. There is no such thing as a *vis medicatrix naturæ*, and likewise there is no disease which can withstand homœopathy. All diseases are curable by its means, but each individual disease by one specific remedy alone, which cannot be replaced by any similar one. Hence occasional failures are due, not to homœopathy itself, but to human short-sightedness, which overlooked the proper homœopathic remedy. — As the result of these principles, homœopathy, more than all other medical systems, produces the impression of reckoning upon the ingenious arrangement of deception and the credulity of the weak-minded. Indeed, so far is this the case that we must keep constantly before our eyes the in many respects eminent character of its founder, in order to avoid constant recurrence to this idea. — Hahnemann too sought the origin of his theory of Similia similibus in the writings of Hippocrates, Thomas Erastus, von Störck and Stahl (see Bakody). As a specimen of his pharmacodynamics we quote the following passage:

"When . . . lycopodium seed is treated in the method by which homœopathic art develops the raw drugs, and a grain (0.05) of it is brought by means of a triple trituration of one hour, each time with 100 grains (6.0) of milk sugar, to the millionth dilution and potency, a remedy is produced of such wonderful power, that one grain of the latter . . . . dissolved in 100 drops of dilute alcohol and shaken twice in the hand, exhibits a medicinal fluid, which, even in the smallest dose (one or two pellets, of the size of a poppy-seed, moistened with it), is still entirely too active in the diseases for which it is appropriate. Even the fluid diluted still more highly, up to the billionth (second) potency, cannot yet be employed for patients, even in the minute dose aforesaid, in consequence of its excessive violence. Not until the potentized sextillionth dilution (VI.) does the drug begin to be useful, provided, however, that for irritable and feeble patients only the still higher potentized dilutions, the octillionth (VIII.) and decillionth (X.), are employed, in the dose of one or at most two very small pellets moistened with the fluid. The lycopodium seed occasions 891 different symptoms, which the homœopathic physician must simply record, and the statements relative to its observed effects sometimes read curiously enough, e. g. only one hair on my head aches etc., etc. A suitable dose of this remedy, when rightly selected, continues its effects for 40 to 50 days, or perhaps a little longer." (See Wunderlich.) After five days it occasions itching of the nose, after eleven days griping in the hepatic region, after 28 days its effect extends still further downwards and produces pruritus ani. The first evacuation after taking this drug is still lumpy, but after sixteen days the passages become soft etc. — Bakody (Hahnemann redivivus, 1883) calls such examples, indeed, "perfidious selections" on the part of his opponents, but, even under more favorable criticism, they give evidence of weighty errors in observation. On the other hand, it must justly be granted that many excellent principles are to be found in Hahnemann's views, and these his followers, e. g. Bakody — have known how to select.

The causes of morbid phenomena in acute conditions are errors of diet, in the widest sense, and external injurious agencies, including the ordinary miasmata, contagia etc., while for chronic lesions there are three chronic miasmata, the psoric, syphilitic and condylomatous. In the latter class of causes are to be numbered also the inbred and hereditary troubles induced by the drugs of allopathic physicians, which, like the miasmata last named, have existed in the human body from time immemorial. Seven times out of eight, however, the psoric "chronic" miasma, i. e. "Psora", suppressed itch, is the cause of disease, a truth in the investigation of which Hahnemann spent not less than thirteen years of his life, and which then transmitted to popular knowledge occasions at the present day much silly babble everywhere about suppressed itch.

By long study Hahnemann had discovered 412 symptoms of the "psora", and he said that the itch, deprived of its chief symptoms upon the skin (which still existed in the leprosy and were easily gotten rid of, but now had been for three centuries driven in), occasioned "so many of its secondary symptoms, that at least seven eighths of all chronic complaints arose from this single source, while the remaining eighth was due to syphilis or sycosis, or a complication of two of these three miasmatic chronic diseases, or (in rare cases) of all three".

There are only general diseases, none local. The products of disease found on post mortem section are the result of blundering, and particularly of the blunders of allopathic physicians. Such residua are not found after homœopathic treatment. — Hahnemann, however, never made autopsies.

In order to correctly comprehend the extremely important action of drugs upon the healthy it is necessary to administer simple remedies and to record, or still better to have recorded, these effects in their most minute details, without any influence from examinations etc. Then the pure forms come to light. In this way we find e. g. that lycopodium seed in the homœopathic dose occasions almost inexpressibly wonderful phenomena.

It produces falling of the hair, confusion of thought, eruptions, and makes people fall asleep during coitus without the occurrence of emission. — In these provings of drugs we observe both primary and secondary effects. By means of the former the vital force is imperceptibly altered; by means of the latter, however, the organism protects itself from the drug, especially when the dose has been too large.

Special pathology in reality does not exist, and the whole of Diagnostics is based upon a search after the similarities between the phenomena of disease and those produced by drugs

In therapeutics there are specifics only, and their efficacy (in entire contradiction to the experience of sensible men) is continually enhanced by dilution, since they thereby multiply many fold their effective "spiritual" principle by transferring it to the material of solution or dilution, restamping this solvent itself with the drug.

"To smell (!) of one decillionth of a grain of silica, potentized to the millionth attenuation by thrice triturating one grain, each time for one hour, and always in 100 grains of sugar of milk, which one grain dissolved in alcohol in 27 diluting vessels has brought to the 30th, i. e. the trillionth development of potency, is sufficient for the cure of baldness, dandruff, gray cataract, amaurosis, nocturnal incontinence of urine, excessive sexual passion, fetid sweating of the feet and incapacity to think." — Such statements Bakody calls a "hyperdynamical theory of potency", proceeding from a "consistency which sacrifices all facts", and he says that owing to this theory opposition was excited within the Hahnemannian fold itself, and thus it resulted that "the hoary reformer with his ultradynamic followers separated themselves completely from the common tendency of scientific effort, and the former in his latter years became a victim of illusions." Among the "soap-bubbles of morbid consistency of this old man in his second childhood" belong undoubtedly the statements mentioned with entire credence by Hegewald in 1884: "Digitalis is indicated in double vision, cannabis, alternating with magnesia, in capsular cataract, euphrasia, in coughs which make their appearance by day only, hyoscyamus, in nocturnal coughs" etc.

A single dose of a properly chosen specific frequently cures immediately, but often also it seems at first to produce an aggravation of the symptoms. This, however, finally passes away of itself, or must be removed by new drugs. Not infrequently the proper disease is first revealed by means of the remedy. The effect of homœopathic remedies is extended through long periods, and may persist for weeks and months. Hence the same dose of the drug should not be administered anew until an improvement is no longer observed. *In the administration of homœopathic remedies the strictest diet is always to be observed.* Accordingly it seemed to Göthe that "he who in his own person carefully adheres to an appropriate diet, already unconsciously approximates to the 'method' of Hahnemann" Allopathic treatment is only admissible in poisoning, syncope, choking etc. — The inventor of this hyperdynamic system, which, a few points of agreement excepted — Erasistratus too e. g. considered the most minute doses specially efficacious — stands in contradiction to all the earlier views, as well as to all experience and the results of what is regarded as reasonable observation and thought, but which certainly did not, like the system of Rasori, facilitate direct murder, was

Samuel Christian Friedrich Hahnemann (1755–1843) of Meissen, son of a poor but skilful porcelain painter of that town.

From 1775 Hahnemann pursued his studies in Leipsic, and after 1777 in Vienna, chiefly under the direction of Quarin. Struggling continually with poverty, which led him to take the position of a family physician in Hermannstadt, in the family of the governor of that city, he thus obtained the means to take his medical degree in Erlangen about 1779. He then practised in Hettstädt (now famous in the history of the trichina) and Dessau, was next physicus in Gommern, near Magdeburg, then a physician in Dresden and Leipzig, where he also devoted his attention to chemistry (mercurius solubilis Hahnemannii, Hahnemann's wine-test) and to translating. He was induced by Cullen to test upon himself the effects of cinchona, and is said to have thus been attacked by the symptoms of intermittent fever, a fact which ultimately led him to his maxim "Similia similibus", already formulated by Paracelsus. This principle once discovered, Hahnemann felt it necessary to test it in practice, but, in consequence of his habit of dispensing his own drugs, he fell into a conflict with physicians and apothecaries, which assumed wide dimensions. From 1790 forward, hunted from place to place by both these opponents, he became in 1792 superintendent of the insane asylum at Georgenthal in Thuringia, and in 1794 physician in Pyrmont and Brunswick. Here, as his enemies relate, he from necessity occasionally feed the relatives of his epileptic and insane patients, at the rate of many professors, and cheated whenever an opportunity offered itself. In 1795 he practised in Königslutter, where he proved belladonna, "the remedy for scarlet fever"; then in 1800 he was in Altona, Eilenburg, in a village near Leipzig, and (repeating the fate of earlier adepts) in 1802 in Wittenberg and Torgau. From the latter town Hahnemann first addressed his writings to the right quarter — the laity. In 1805 he first introduced the word "homœopathy" (in contradistinction to "allopathy", a term which he also invented), and thus gained an effective war-cry, and of course only increased still more the bitterness against his doctrine and himself. His theory gained in influence through the publication in 1810 of his chief work the "Organon der rationellen Heilkunde". In 1811 Hahnemann settled in Leipzig, where he gave lectures. His early followers, some of whom were young men without any education, proved drugs upon themselves (Stapf, Gross, Hornburg, Wislicenus etc.) and practised homœopathy at once. Hahnemann became an extremely popular physician, patronized now by persons of rank, who, indeed, have almost always considered it their privilege to set the fashion of running after nonsense and charlatanry in medicine. Of course their example is then followed by those of lesser rank and by the lowly. In 1818 homœopathy was interdicted, though an interdict in matters of opinion, and above all of faith, always produces only an effect opposite to that intended. In 1821 the Saxon authorities forbade physicians to dispense their own drugs. Hahnemann now went to Köthen as physician-in-ordinary and counsellor of the then lord of Anhalt-Köthen, where his popularity increased still more rapidly than before. Five years after the death of his first wife (1830) Hahnemann married a young Frenchwoman, Melanie d'Hervilly, who enticed him to Paris, where the old man died in 1843 — a millionaire. His practice was continued by his widow. — In the year of Hahnemann's death a kind of state examination for homœopathy was introduced into the Prussian regulations, and in 1851 and 1855 monuments to his fame were erected in Leipsic and Dessau. — In addition to his chief work mentioned above, Hahnemann wrote numerous articles for medical journals and many books. Among the latter we may mention his "De helleborismo veterum", 1811; "Reine-

Arzneimittellehre", 1811; "Die chronischen Krankheiten"; "Die Heilung der asiatischen Cholera"; "Die antipsorischen Arzneien" etc.

From the outset the laity, and particularly the nobility, were the most eminent adherents of the doctrines of Hahnemann,[1] though the latter were also favored by Hufeland. Among these lay homœopaths we may mention E. G. von Brunnow (1796–1843), the poet, and Hahnemann's son-in-law von Böninghausen. From the list of physicians who followed Hahnemann's doctrines, though characteristically enough they were not recognized by Hahnemann himself as full homœopaths, we may notice among many others: Moriz Müller and Carl Hanbold at Leipsic, Wilhelm Gross (died 1847) in Jüterbogk and J. Eduard Stapf (born 1788) in Naumberg who founded in 1818 the "Archiv für die homöopathische Heilkunst". Müller was also the director of the first homœopathic clinic in Leipsic (1822), and like Ludwig Schrön in Hof, Gottlieb Ludwig Rau (1799–1841, "Organon der specifischen Heilkunst") of Erlangen, P. Wolf in Dresden, Karl Friedr. Gottfr. Trinks (1800–1868) in Dresden and A. Noack and L. Griesselich, founder of the homœopathic union in Baden and editor of the journal "Hygeia", speedily wandered away from the "pure doctrine". The same may be said of J. Th. Rückert in Herrnhut (1800–1885). Hausmann (died 1876), professor of homœopathy in Pesth, Jos. Buchner (1813–1879) professor in Munich and a famous homœopath; Goullon (died 1883) in Weimar etc. George Rapp (1818–1885) of Annweiler in the Palatinate, was professor of the clinic for internal diseases in Tübingen. In this position he undertook investigations regarding the therapeutics of Hahnemann, Rademacher and the so-called allopathic system, and finally decided in favor of the first. Accordingly in 1854 he was removed from his professorship and became physicus in Rottweil. Finally he was appointed physician-in-ordinary to the queen of Würtemberg. Joh. Heinrich Kopp

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[1] How far the enthusiasm for Hahnemann's doctrines went is shown by a hymn to the air "Lasst uns, ihr Brüder" etc., communicated by Stricker in Frankfort, and which we quote for the edification of the partisans and opponents of homœopathy:

"Homœopathik, himmlischer Strahl,
Dein Preis erschalle
Froh beim Pokal.
Wesen zu retten
Vom frühen Grab,
Sandte ein Gott dich
Vom Himmel herab.
Dummheit und Dünkel
Mordeten hier
Blindlings und klügelnd
Menschen und Thier.
Einfach und ewig,
Wie die Natur,
Folgt deine Lehre
Dieser auch nur.
Schnell drum verschwindet,
Dauernd und mild,
Körpers und Geistes
Leidensgebild.
Und der Erkrankten
Genesen jetzt viel,
Ohne Beschwerden
Wandelnd zum Ziel.
Freut Euch dess, Freunde!
Jubelt entzückt,
Dass unsre Lehre
Sicher beglückt.
Weihet drum dankbar
Leben und Kraft,
Ihr, die seit Jahren
Gutes nur schafft."

(1777-1858) in Hanau, Joh. Mich. Leupoldt (born 1794, died a few years ago) in Erlangen, Fleischmann in Vienna and W. J. A. Werber were also favorers of homœopathy with very important modifications. In surgery homœopathic principles were employed by J. A. Schubert. F. A. Günther, Joh. Wilh. Lux (1773-1850) in Leipsic, W. Starke, J. C. Schäfer (Homöopathische Thierheilkunst, 2d. ed. 1856) and others were partisans of homœopathic principles in veterinary medicine. — Among modern homœopaths we may mention O. Buchmann in Alvensleben (microscopic and other observations and investigations regarding the solubility of the metals etc., 1881); Dr. Hegenwald (Hahnemann's atomic doctrine) etc.

For every precept laid down by Hahnemann there gradually developed distinct shades and parties, and by these continual changes, new explanations and "principles" there arose finally a "new" homœopathy, the scientific system, an expression implying that the old system was not scientific. The most important representatives of this modern homœopathy are: Altschul (Lehrbuch der Homöopathie); von Grauvogl (Grundgesetze der Physiologie, Pathologie &c.; das homöopathische Aehnlichkeitsgesetz; offenes Sendschreiben an Liebig, 1861) and Bernhard Hirschel (died 1873) in Dresden, the "most scientific" of homœopaths and an historian, particularly of the "Vienna school", equipped with both medical and general education. (Grundriss der Homöopathie nach ihrem neuesten Standpunkte, 2d. ed., 1854 etc.). The Würtemberg "Obermedicinalrath" Paul Sick (Die Homöopathie im Diaconissenhause zu Stuttgart, 1879), and Prof. Bakody in Pesth, who, by the way, is frequently very sober in his criticisms, should also be mentioned in this connection.

> "The more modern school, like the older allopathic system, recognizes the necessity of an anatomico-physiological basis, respects the *vis medicatrix naturæ*, acknowledges the benefit of crises etc., and holds to the necessity of diagnosis in disease and the investigation of the character of the disease in addition to the complex of symptoms." "Homœopathy demands even a diagnosis of the remedy, which must agree, i. e. must manifest a similarity, as far as possible, with the disease." "Homœopathy discards all generalization and desires the most individual specialization." "It is not a question of the dose, but of the *selection* of the remedy, which is the substance of homœopathy. Whether larger or smaller doses, powders, tinctures or infusions are administered, is all one, provided only that the simile, i. e. the specific relation of the remedy to the locality and variety of the disease is preserved." (This homœopathy, accordingly, does not compel the wife of a homœopathic physician to say: "Why don't you prescribe for us such and such pills? Then we would not need to consume every year so many hundredweight of prunes!", nor could Stromeyer say of it, "What sort of a medical art is that which cannot even open the bowels?", for it can no longer discard purgatives and emetics as Hahnemann did.) "The principle similia similibus therefore continues to be the most important characteristic of the modern school, a principle, however, to be so explained that it does not suggest merely an external similarity of symptoms, but an agreement between the disease and the remedy founded upon the seat, character, course etc. of the former; for mere physiological similarity, without taking into account the pathological character of the disease, is not sufficient" (Hirschel). Bakody admits only the following principles of Hahnemann: "Experimental proving of

drugs, one by one, upon the healthy human organism, observing carefully all their toxicological effects." "A universal and strict comparison and differentiation of the pathologico-physiological and pathologico-anatomical changes produced experimentally in the healthy by each single drug, comparing them with those of the morbid processes which they resemble." Also for therapeutic purposes the employment of a single remedy only, and, indeed, one selected in accordance with the law "Similia similibus" derived from experiment upon the healthy. The fourth principle requires the employment for therapeutic purposes of a single drug only, and in relatively small doses.

We see that of the original homœopathy not much more than the name (defined as something substantial, but really an empty word) survives. Independent of this there remains no substantial characteristic of the old homœopathy, except that the remedy must be "diagnosticated".

That a doctrine like Hahnemann's, which in so many ways broke with all the past and with all previous reasonable observation, must work a revolution in the lay circles, to whose "better" judgment it appealed and whose medical velleities it flattered, was a matter of course. It put, indeed, to the proof the famed, sound and simple common-sense of the masses, and the latter — succumbed, as it has ever done before the mystical doctrines of medicine. For in the idea of the majority of the laity medicine still appears to be a mystical knowledge or a blind matter of experiment. In this the 19th century is precisely like the Middle Ages — and upon the thoughtless assumptions and superstition of both the educated and uneducated depends the success of homœopathy, though the rage for fashions in medicine smooths the way. How long before the appearance of homœopathy was it that many physicians still practised magnetism and visceral clysterization? Many of Hahnemann's disciples too knew that, as Fr. A. Lange says, "Charlatanry in medicine is better paid than rational treatment."

The following physicians, among others, were important opponents of the doctrines of Hahnemann: Stieglitz, who ever stood upon the wall when false ideas threatened a breach in the defences of Hippocratic art; Kurt Sprengel; L. Wilh. Sachs (1787–1848), professor in Königsberg; Bogislaus Conrad Krüger-Hansen (1776–1850), a practitioner in Güstrow; Joh. Christian Aug. Heinroth (1773–1843), professor of mental diseases in Leipsic, and a pupil of Pinel; Ferd. Gottlieb von Gmelin (1782–1848), a professor in Tübingen; G. von Wedekind; Friedr. Alex. Simon (born 1793), a physician in Hamburg (Samuel Hahnemann, Pseudomessias medicus. Die unsterbliche Narrheit S. Hahnemanni, andrer Theil; author also of "Der Vampyrismus des 19. Jahrhunderts"); Karl Friedr. Heinrich Marx (1796–1877) of Karlsruhe, professor in Göttingen, eminent as an author for his literary style, his profound erudition and thought, and as an apostle of humane and Hippocratic art; Ignaz Rud. Bischoff, Edler von Altenstern (1784–1850), professor in Vienna; Karl Ernst Bock (1809–1873), "Unser Bock" of the "Gartenlaube", and others. — Moreover the "scientific" homœopaths themselves must be regarded as opponents of Hahnemann.

for they have called many of his doctrines whims and senile weaknesses (see Bakody), or sacrificed them as utenable. Hence some of them introduce him in the third person and in large capitals, like a deity, in order by such external and ridiculous homage to make amends for their internal scorn for the man. It is characteristic, at all events, that Hahnemann found no pure and absolute followers among the homœopathic physicians of reputation. "For the thoughtful among his disciples . . . . . the doctrine of Hahnemann remains a scientific method for the erection of a science of healing" (Bakody) — the thoughtless, however, are merely simple dupes. — An offshoot of homœopathy, which by its foulness brought much harsh criticism upon its parent system, was the doctrine called

ISOPATHY,

the filthiest theory, at all events, ever invented. According to this system, like was to be cured by like, i. e. small-pox by variolous pus, diarrhœa by fæcal matter, gonorrhœa by gonorrhœal pus — taken internally be it understood! — tapeworm by the ingestion of joints of the tapeworm, and a lot of such remedies. Among the Isopathists were Lux and G. Fr. Muller. It would thus seem that no pure or impure possibility, and no conceivable absurdity can be adduced, from which it is impossible to form a medical theory. And so it is certainly not the most gratifying advantage of the study of the history of medicine that we observe how every absurdity, if it is only preached up with the necessary confidence and perseverance, finds its dupes and followers, and that history is often, in the most unheard of ways, metamorphosed into a record, mildly speaking, of human follies. And the fact that this statement holds quite as good for our own century as for any period of the Middle Ages or of Antiquity, furnishes us a thoroughly humiliating historical doctrine and truth, to wit, that as long as men live and labor, folly and reason dispute the balance, and that reason by no means always depresses its side of the scale. One of the most fraudulent outgrowths of homœopathy is the "Electro-homœopathic System" of count Cesare Mattei (Neue Methode etc., Stuttgart, Edwin Hahn, 1880), the substance of which may be judged from the following passage: "But what do we know of vegetable (sic!) electricity? So say the doctors, and rightly, for even I who discovered it know nothing of this agent. I know that I investigated it and found only a little magnesia. I noticed that this vegetable fluid manifested a quick and often momentary activity, and I said: 'This activity is electrical; it is electricity.' I have seen this electricity cure troubles regarded as incurable, and I said to myself: 'This is a remedial agent.' That is all I know of vegetable electricity, and far be it from me to make a secret of it. On the contrary I tell it to all, even to those who do not wish to know of it!!" — Such nonsense and fraud is preached up by many in this 19th century, the century of education, invention and advancement, and numbers swear by it, to the pecuniary profit of these bold representatives of humbug!

The doctrine of Hahnemann too undermined the very foundations of medical tradition as they had been held for centuries, so that even to-day they are tottering from the shock, and it especially summoned medicine to a new proof and simplification, as well as to a rarer employment of its apparatus of healing. This must be regarded as a ripe and cultured service to medicine. But, on the other hand, in a social direction its influence was undoubtedly injurious, inasmuch as by its popularization of medical practice it was partially responsible for the fact that the social standing of the physician was lowered in comparison with earlier ages.

While homœopathy in Germany, in spite of individual examples to the contrary among the laity, seemed among physicians at least to be verging towards extinction, after the erection of the new German Empire, which offered to physicians unbridled quackery as its earliest gift while its first statesman for a long time encouraged charlatanism, the system of Hahnemann began again to flourish almost as luxuriantly as among the humbug loving portion of the inhabitants of the United States. In Würtemberg in 1883 the state even licensed a homœopathic pharmacy. In 1886 there were four exclusively homœopathic central pharmacies, together with numerous others which kept homœopathic remedies. In the United States there are 32 homœopathic pharmacies, and even in England homœopathy flourishes. The same may be said of France where many works upon the subject of homœopathy have recently appeared. Among these we may notice: Hirschel's "Guide du médecin homœopathique au lit du malade", 1874; Alexis Espanet's "Pratique de l' homœopathie", 1875; Hoffmann's "L' homœopathie exposé aux yeux du monde" 1870; Constantin Hering (born in Oschatz, Saxony, in 1800, died in Philadelphia in 1880), who (1834) introduced homœopathy into the United States, wrote "The Domestic Physician", 1858, with numerous medical essays; Jahr's "Nouveau manuel de médecine homœopathique", 1872; Prost-Lacuzon and Berger's "Dictionnaire vétérinaire homœopathique", 1865; Gunthers "Nouveau manuel de médecine homœopathique" 1871, etc. etc. Most of these works, it is true, are translations from the German. But it is precisely these excrescences of German medicine that have contributed to the discredit of that science among the French! Thus Bouchut, in his history of medicine which appeared in 1873, calls homœopathy in its entirety — and, alas, with justice! — une folie allemande.

[In England the system of Hahnemann is said to have been introduced in 1827 by a Dr. Quin, physician to the king of the Belgians. It has never, however, become very popular in the "land of common sense", and even at the present day is said to comprise not more than 300 registered physicians in the whole British Isles. Liverpool e. g. enjoys the luxury of but 10 homœopathists, Glasgow but five etc. In London there is a single homœopathic hospital with 100 beds, and connected with this institution the only college of instruction in the United Kingdom. In a country like the United States, where every "free and enlightened" citizen, male or female, feels abundantly competent to criticise not only medical opinions but also religious beliefs, it is by no means surprising that homœopathy has met with considerable popularity. Incomprehensible, of course, to the majority of its adherents, its very transcendentalism renders the doctrine popular — omne ignotum pro magnifico — and in certain circles faith in the illusions of homœopathy is naturally regarded as an evidence of precocity (!) of intellect. The fact too that this system dispenses with all the disagreeable elements of medication has contributed largely to its adoption among the more fastidious, or as they would doubtless call themselves the more "intelligent". The earliest practitioner of homœopathy in the United States is said to have been Dr. Hans B. Gram (again a German), a native of Boston, but educated in Copenhagen. On his return to the United States in 1825 he settled in New York, where he died in 1840. In 1844 the American Institute of Homœopathy was founded with about 50 members. The earliest homœopathic journal established in this country appeared in New York about 1834. It was entitled "The American Journal of Homœopathia" and was edited by Drs. J. F. Gray and A. Gerald Hull. In 1886 the homœopathic fraternity claimed 11,000 practitioners in the United States, with 5 national and 28 state societies, 51 hospitals, 48 dispensaries and 22 journals. The homœopathic colleges were also credited with a production of 500 physicians annually. It should, however, be stated, that while the shibboleth of homœopathy is preserved, the system of Hahnemann has become almost extinct in the United States, as well as abroad. Barring some few simpletons, for whom the potencies of Hahnemann conceal the impotence of their own intellectual capacities, the majority of so-called homœopathic practitioners of the present day pride themselves upon an eclecticism which stands ready to appropriate what experience proves useful in any system. In a word they are "regular" physicians without knowing it, merely employing the term "homœopathic" as a bait to attract the unwary, or, like the sugar-coating of a pill, to disguise the disagreeable facts within.

While as a system of medicine homœopathy can claim no considerable importance, as a protest against the hypermedication of Rasori and his school it has doubtless accomplished no little good. The apparent successes of its followers have led thoughtful physicians to a more careful study of the natural history of disease and to greater caution in the differentiation of the *post hoc* and *propter hoc* in therapeutics. While too the regular profession, under the guidance of the French and Germans, has devoted a too exclusive attention to pathology and the perfection of diagnosis, and in therapeutics has adopted a practical nihilism, the homœopaths, proceeding to the opposite extreme, have over-elaborated their so-called system of therapeutics, to the practical exclusion of diagnosis and pathology. Here too the middle course is the only safe one, and the protest of the homœopaths against the super-scientific but inhuman tendency of the regular profession has awakened in the latter an increased activity in the study of the therapeutic action of drugs, which if properly directed and controlled, will, we trust, in the near future produce beneficent results. -- Of the homœopathic system itself the old criticism that "What is true is not new, and what is new is not true" seems fair enough even at the present day. H.]

Intimately connected with the natural-philosophical tendency in medicine, a tendency which ultimately enveloped that science in a fog of philosophical phraseology, and especially by its long continued supremacy worked to its injury, stands a system or theory comparable, at least in its influence upon life, to Mesmerism and Hahnemannism. As the latter systems introduced among the masses supernatural and simple therapeutical notions and habits, so by means of the doctrine of

d. Cranioscopy

(called by Gall Organology, by Spurzheim Phrenology and by others "Craniology"), they now began to occupy themselves with physiologico-psychological problems. Thus the doctrine of Gall, which in itself supplied some fruitful ideas, was distorted into a grotesque affair of fashion, a result particularly favored by the fact that it still preserved some mystery, inasmuch as its author did not publish his theory until 1810. In this way the otherwise deserving founder of this system occupied an ambiguous light with the better class of physicians through the impression produced by his doctrine, went astray himself, and was finally, by his own fault, but underservedly, degraded into the Mesmer of physiology.

Franz Joseph Gall (1757–1828), of Tiefenbronn, near Pforzheim in Baden,

expounded his doctrine in Vienna as early as 1796. It was, however, interdicted by the authorities in the following year, because danger to the faith and loyalty of subjects was smelled in the new system. Gall now went to Germany, lectured upon his doctrine in different cities and testified to it practically, e. g. in the prisons of Spandau and Berlin. In the latter city of intelligence (a quality now assumed to be established too in its physical basis) two medals with his likeness were struck! Still this enthusiasm did not last long, and Gall, with Spurzheim, a pupil whom he had obtained in Vienna, went to Paris, where the new theory was at once received with sympathy. Gall continued to practise in Paris and became very rich, dying at Montrouge, near that city, in 1828.

Dr. Joh. Caspar Spurzheim, his pupil, and, like Gall himself, a gifted and deserving anatomist, was born at Longwich, near Treves in 1776. Originally a theologian, having accepted with enthusiasm the doctrine of Gall, he was instrumental in introducing it into England, where he resided from 1813–1817 and 1821–1828. In 1832 he came to the United States and was attracting great attention to his theory when he died at Boston Nov. 10th of the same year.

Secret phrenological societies (like those of Mesmer) were quietly established, the first being organized at Edinburgh in 1820. The agitation of Spurzheim (whose teachings, like those of Gall himself, were not without a beneficial influence upon psychiatry) led to the formation of other societies in London and Paris, and even in India. In the year 1832 the number of these societies in Great Britain alone amounted to 29. Spurzheim also established a special journal devoted to phrenology, the editors of which were George Combe of Edinburgh and H. C. Watson, [while among its prominent contributors were Sir George Mackenzie, Macnish and others. This journal reached the 20th volume, having survived from 1823 to 1847. Among the prominent supporters of phrenology in England were also Andrew Combe, John Elliotson (also devoted, as we have seen to Mesmerism) and archbishop Whately. — In the United States the teachings of Gall and Spurzheim were introduced by Dr. Charles Caldwell (1772–1853) of North Carolina, who had been a pupil of Gall and devoted himself between 1821 and 1832 to the dissemination of his master's doctrines from the rostrum and by the formation of phrenological societies. George Combe also delivered several courses of lectures in the United States on the subject of phrenology between 1830 and 1840. Among the most active apostles of the new doctrine in the United States, however, were O. S. Fowler, his brother L. N. Fowler, their sister Charlotte (Fowler) Wells and her husband Samuel R. Wells (died 1875). The "Phrenological Journal" was established by them in 1863. Other important representatives of phrenology in the United States were J. S. Grimes, Nelson Sizer, J. R. Buchanan of Cincinnati, W. B. Powell of Kentucky, John S. Hittell of New York, D. P. Butler, Dr. Levi Reuben etc. H.]

Gall, who undoubtedly deserves great credit for his labors upon the anatomy of the brain, considered the latter a series of independent "organs", located beside each other, and held that protuberances upon the external surface of the skull showed with precision the degree of development of these organs. The dispositions were, indeed, preformed, but by education they might be developed in a good direction, i. e. the disposition to evil might be restrained and made inactive, so that e. g. a man with a disposition towards murder need not necessarily be an actual murderer. — This assumption of special districts in the brain for special mental faculties has, indeed, many grounds in its favor, and has, even in more recent times, received some confirmation from experiment and observation. Gall, however, converted his theory into a "system" too speedily, and after mere observations upon the skull.

He assumed 27 "organs": the reproductive sense; sense of love of children; of friendship; sense of self-defence, courage and quarrelsomeness; of murder; of cunning; of association (in animals); of theft; sense of elevation, pride; sense of vanity, sense of glory; sense of caution; sense of things, memory of things; sense of locality; sense of persons; sense of names; sense of words; sense of language; of colors; of tones; of numbers; sense of art, of construction; comparative sagacity; the metaphysical sense, profundity of mind; sense of wit; the poetic sense; sense of good-nature; sense of imitation, mimicry; the theosophic sense; sense of stability, firmness.

Spurzheim divided the organs still more minutely:[1]

First Class: Feelings.		Second Class: Intellectual Faculties.	
FIRST ORDER.	SECOND ORDER.	THIRD ORDER.	FOURTH ORDER.
Propensities.	*Sentiments.*	*Perceptive Faculties.*	*Reflective Faculties.*
Amativeness,	Self-esteem,	Individuality,	Comparison.
Philoprogenitiveness,	Love of approbation,	Sense of form,	Causality.
Concentrativeness,	Cautiousness,	" " size,	
(Inhabitiveness),	Benevolence,	" " weight,	
Adhesiveness,	Veneration,	" " color,	
Combativeness,	Firmness,	" " locality,	
Destructiveness,	Conscientiousness,	" " numbers,	
(Alimentiveness),	Hope,	" " order,	
Secretiveness,	Wonder,	" " eventuality,	
Acquisitiveness,	Ideality,	" " time,	
Constructiveness.	Wit,	" " tone,	
	Imitation.	" " language.	

Of course the *pros* and *cons* of this system brought forth an entire literature of their own.

Among its partisans were T. Forster, G. Comte, G. S. Mackenzie, Cloquet, Broussais, Bouillaud, Andral, Fossati, Karl Otto in Copenhagen and others. Conditional followers were J. A. Walther, J. D. Metzger, Hufeland, Loder, Reil, Himly &c.

Among the opponents of the system were J. Th. Walther, A. Moreschi, J. F. Ackermann particularly, professor in Heidelberg and Jena; C. A. Rudolphi (1771–1832), a famous physiologist in Berlin and author of a natural history of intestinal worms etc; Serres, Flourens, Magendie and others.

The subject was studied at a later period by K. K. Noël, K. G. Carus and, latest of all, by Gustav Scheve, who died in Frankfort-on-the-Main in 1880.

Göthe, who, both during his university course and subsequently, was much interested in medicine and accordingly studied cranioscopy, took a very profound view of the doctrine of Gall. "The brain remains the foundation and chief object, since it is not required to adapt itself to the skull, but the skull must conform to it. So far is this the case that the internal diploë of the skull is arrested by the brain and confined by its organic boundaries. On the other hand, in case of a sufficient supply of bony material, the external lamina asserts the right of enlarging itself even to a monstrous degree, and of forming internally so many chambers and departments. In every way Gall's demonstration of the brain was superior to that of the schools, where the organ was cut into horizontal or vertical sections and a view given of certain parts following one after another, to which names were assigned, as if this were all that was necessary. Even the base of the brain, the origins of the nerves, remained known as mere localities, from which I, interested as I was, could gain nothing further." Göthe desired to draw some general conclusions, and even Gall went too far into the specific to suit him. "Whoever bases his position upon the general will probably be unable to rejoice in a number of desirable pupils. On the other hand, the particular attracts mankind, and justly so: for life is assigned to the particular, and very many men can prosecute their life in the particular, without necessarily advancing further than the point were human reason comes to the aid of their five senses."

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[1] Fowler and Wells increased the number of faculties to 43, and likewise changed some of their names. (H.)

Some previous views of a similar nature are to be found too among the Ancients and the Arabians. The latter assumed in the four ventricles of the brain the seat of common sensation, of imagination, judgment, and recollection. Similar hints are to be found in Albertus Magnus, Mondino, Petrus Montagnanus, Ludovico Dolci, Willis, and Charles Bonnet, who styled the brain the "rendezvous of very different organs".

The theory of **François Joseph Victor Broussais** (1772–1838), designated

e. Physiological Medicine (better Broussaism),

exhibited a mixture of the views of Brown, Pinel and Bichat, combined with Friedrich Hoffmann's doctrine of the sympathy of the various organs with the stomach, Stoll's concealed inflammation and gastricism, and the theory of inflammation of Marcus.

Broussais, the son of a physician at St. Malo in Bretagne, manifested even in his youth unusual mental as well as corporeal strength, and, as the result of both, a disposition to brawling and fighting in both departments. In 1792 he volunteered in the army of the Republic, but rose only to the grade of a sergeant. Returning home sick, his father succeeded in inducing him to become a physician. However, when his parents were murdered and his house burned down, he tried his fortune upon a privateering vessel until 1798, when he betook himself to Paris, at the age of 26, in order to prosecute his studies. Bichat particularly gave him assistance. Graduating in 1803, he practised two years in Paris and then served for three years with the armies of Napoleon in Holland, Germany, Austria and Italy. On his return to Paris he published his "Histoire des phlegmasies ou inflammations chroniques" (1808), and then again went as an army surgeon to Spain until 1814. In the latter year he was appointed second physician to the hospital Val de Grâce, and in this position began his private lectures upon his new doctrine. The attendance upon these lectures was immense, but his success, combined with his reckless antagonism of the ancient doctrine, brought him enemies and quarrels. This was particularly the case after 1816, when he published his "Examen de la doctrine médicale généralement adoptee" etc., a work, which did not, however, require a second edition until the lapse of five years. One year later his "Annales de la médecine physiologique" began to appear and were continued until 1834, in which year his "Traite de physiologie appliqué a la pathologie" was published. In the year 1828, in a work entitled "Sur l'irritation et la folie", he applied his principles to mental diseases. Finally in 1831 Broussais was appointed ordinary professor. According to L. Stromeyer, Broussais was not an extraordinary teacher, but was extremely self-conceited and passionately wrangled with, and indeed even abused, all who declined to accept his doctrines unconditionally. As a therapeutist he was simply a man of routine. His star, however, declined, to rise only once again in

1836, when he delivered his lectures on phrenology. Two years later Broussais died at Vitry, where a monument was subsequently erected to his memory.

Life, according to Broussais (as with Brown at an earlier date), depends upon external irritation, especially that of heat. The latter excites in the body peculiar chemical processes, which in turn maintain regeneration and assimilation as well as contractility and sensibility. When these functions supported by heat cease, death at once ensues. Health depends upon the moderate action of the external irritants; disease, upon their weakness, or more frequently upon their extraordinary strength. Disease is nothing whatever ontological.

For Broussais, in contrast to Brown who held almost all diseases to be general (and asthenic), general diseases or essential fevers do not exist at all, at least not immediately upon the action of abnormally strong irritations. They always originate from local irritations proceeding from a certain diseased organ or part of an organ, particularly from the heart, and most of all from the mucous membrane of the stomach and intestines, and diffuse themselves throughout the rest of the body through sympathy and by way of the nervous system. The ganglionic system is a system of nervous centers related to the general nervous system, transmitting irritations sympathetically like the latter, and independent of the will. Too strong irritants produce an "irritation", which manifests itself as congestion (active congestion). General debility, which we observe in disease, depends upon the fact that if the excitement in one part is too strong, it becomes abnormally weak in the other parts, and is thus generalized. In this way too congestion (passive congestion) may occur. Every irritation, which through sympathetic irritation of the heart produces fever, has become an inflammation, and the main criterion of the latter is hyperæmia. If the sympathetic irritation is stronger than the original and local irritation, we have the so-called metastases. If these appear in the secreting organs and are also beneficial, they are to be understood as crises. All strong "irritations" have the common property, on the one hand, of exciting the brain sympathetically (hence headache, vertigo), and on the other, of producing congestion or inflammation of the stomach (hence the coated tongue, lack of appetite). The affection of the stomach always excites the small intestine, and both always suffer together. Since, however, the sympathetic irritations of the brain are almost always the effect of irritation of the stomach and small intestine, we have almost always to deal exclusively with the famous "gastroenteritis", which likewise is the source of the essential fevers. ("All the essential fevers of the authors are referable to a simple or complicated gastroenteritis. This they have misinterpreted when it is unaccompanied by pain, and even when pain has been found to exist, they have always regarded it as a symptom. A knowledge of the morbid conditions of the stomach is the key to pathology.") Through complications it occasions typhus and all other so-called infectious diseases, including the epidemic diseases of the skin and even the ordinary skin eruptions, which are to be regarded as arising sympathetically from the stomach. Specific morbid poisons, even that of syphilis, Broussais absolutely denied.

Chronic constitutional diseases depend very frequently upon an existing chronic inflammation or chronic gastroenteritis. The same is true of hypochondria and mental diseases.

"Gastroenteritis", "the basis of pathology", is divisible into two varieties. If the gastroenteritis predominates, it is ordinarily accompanied with pains in the gastric region and sudden vomiting of food and drink. If, however, the enteritis is the chief lesion, great thirst, a sensation of internal heat, an abdomen sensitive and hot to the touch, a quick and hard pulse and a tongue coated in the middle and red at the edges, are the characteristic phenomena.

The tissue and organ systems, employing these terms in the sense of Bichat, are the usual routes for the propagation of diseases. In this idea Broussais afforded great support to the tendency towards pathological anatomy. He was a solidist of the tissues and organs. In opposition to the nervous solidists (Cullen etc.), who accepted functional diseases without local lesions, Broussais admitted only local organic changes with subsequent disturbances of function.

In therapeutics Broussais, like Asclepiades and his imitators in many respects, Brown and Hahnemann, admitted no *vis medicatrix naturæ*. Accordingly the physician is not the minister, but the lord of nature. He must anticipate diseases — "çouper", "faire avorter" — particularly the gastroenteritis, against which all his treatment must be primarily directed, since it exists almost everywhere as a primary or sympathetic lesion. For this purpose the antiphlogistic or weakening method is chiefly serviceable; derivative, irritant or corroborant measures are incomparably less useful. Febrile and inflammatory diseases he treated by the withdrawal of nourishment, carried, like everything else, to the extreme. The most powerful antiphlogistic treatment, however, consists not in venesection (which should be employed at most only in plethoric patients and especially in recent inflammations of an organ particularly well supplied with arterial blood), but in the application of numerous leeches to the abdominal or gastric region. In robust individuals at least 30-50 should be applied at once, and it was only in very great debility that 5–8 might be sufficient. In this system of therapeutics often a hundred, or indeed several hundred leeches were applied to a single patient, or, what amounts to the same thing, to a single belly, and it is not to be wondered at when we learn that in consequence of Broussais's "hirudinomania" leeches became scarce, a scarcity from which we probably have to suffer even now. In the year 1833 alone 41,500,000 leeches were imported into France, and only nine or ten millions exported. Yet in 1824 2–300,000 were sufficient to supply all demands!

In order to guard against sympathetic gastroenteritis, leeches should be applied not only to the gastric region, but likewise to the organ primarily attacked. Thus in rheumatism and gout they should be applied to the joints and the pit of the stomach, in croup to the neck and the stomach, in phthisis to the chest and stomach &c. Wet cups rarely accomplish anything. Even in cases of worms the abdominal integument was compelled to pay its bloody tribute, particularly if "enteritis" prevailed. The hypochondriac region and finally even "the contracted neighborhood of the anus" were likewise favorite fields for this "hirudinotherapy", and the matter went so far that in France "every belly is either garnished with leeches or displays numerous scars due to past bites" — and this without regard to the question whether man or woman, youth, maiden or child was to furnish the blood. The anal region was selected e. g. in recent diarrhœa arising from colitis, in colic, dysentery etc. Besides leeches, only a spare diet, mucilaginous and acid drinks, and "antiphlogistico-emollient" poultices to the umbilical region, were favored. If, however, all food was immediately rejected, the physician was to let the patient fast absolutely for several days, and administer tepid foot-baths or complete baths. — Chronic inflammations also, in the majority of cases, of course demand leeches, but applied to the affected parts, e. g. the external scrofulous glands. Even syphilis was treated by direct abstraction of blood from the specially affected locality, and by cooling drinks. — The derivative method by the employment of diuretic remedies, blisters, emetics and cathartics etc., was mostly injurious, since it did little but add a new irritation to that already existing, or increase or render chronic the "concealed" gastroenteritis. This was especially true of cathartic doses of calomel, which were liable to occasion chronic diarrhœa, consumption and dropsy — In rare cases tonics are useful, e. g. in intermittent fever after the failure of antecedent employment of the antiphlogistic method. Cinchona must, however, be administered in such cases with the greatest prudence, lest the "concealed" gastroenteritis return with so much the more violence. Irritant remedies, particularly in the nervous stadium of disease, are to be discarded.

While Broussais rendered good service to medicine by his war against the ontology of diseases which had hitherto prevailed, on the other hand, by his doctrine of the invariably local nature and expression of these he favored the one-sidedness of the anatomical school. His "gastroenteritis" must be looked upon as a systematic phantasy, of which we see, and have seen, so many. Yet it is manifest from what has been said that the sanguinary therapeutics — the touchstone of the doctrine of a physician — of Broussais may be called something of an improvement upon the system of Rasori!

In France and Italy, the land of bloodletting, the doctrine of Broussais gained numerous followers; in Germany and England, however, it had scarcely any. Among the partisans of this doctrine there were in particular many military physicians of eminence.

Besides Dupuytren, to be mentioned hereafter as one of the most eminent of surgeons, the old François Chaussier, who, as already noticed, had introduced Vitalism into Paris, was also a follower of Broussais. The same is true of Claude-François Lallemand (1790–1854) of Metz, first professor in Montpellier, then in Paris, ordinary physician of Ibrahim Pacha and Mehemet Ali and founder of the "Prix Lallemand" ("Recherches anatomico-pathologiques sur l' encéphale et ses dépendances"; "Clinique médico-chirurgicale"); J. L. Bégin (1793–1859), "Traite de physiologie pathologique, rédige suivant les principes de la nouvelle doctrine médicale"; "Traité de therapeutique rédigé" etc.; the Vitalist H. Chauffard (1823-1879), a famous clinical teacher of the Paris faculty at the Hôpital Beaujon and after 1870 the successor of Andral in the chair of general pathology; Jacques M. A. Goupil (1800–1837), "Exposition des principes de la nouvelle doctrine médicale" etc. Louis Charles G. Roche (born 1790) of Nevers, one of Broussais's most zealous followers ("De la nouvelle doctrine médicale" etc.); François Gabriel Boisseau (1791–1836), professor in the military hospital at Metz ("Nosographie organique" etc.; "Pyrétologie physiologique, exposée suivant la doctrine de Broussais"). Antoine Laurent Jessé Bayle (born 1799), who applied the doctrine of gastritis to diseases of the mind; H. M. T. Desruelles, who treated syphilis without mercury and with leeches; A. T. L. Jourdan; M Devergie Sr., both of whom were antimercurialists; P. J. Montgellaz, who wrote on intermittent irritation; Casimir Broussais (1803–1847), adjunct professor at the Val de Grâce and the discoverer of "duodénite", who gave a report of his father's clinic; Pierre François Olive Rayer (1793–1867) in Paris, originally a follower of Broussais and an eminent pathological anatomist, Cruveilhier, and finally

Jean Baptiste Bouillaud (1797–1881), professor, and from 1831 chief physician to the Charité, who adopted particularly the symptomatic nature of fever and the sanguinary therapeutics of Broussais, but, for a change and to originate a "new method", maltreated the poor sick "objects of experiment" by "bleeding coup sur coup", though in this matter he found models in England and Germany. As the homœopaths looked upon Hahnemann (the most sensible man and the most perfect dialectician of all medical heretics), so Bouillaud regarded Dr. Broussais as the "Messiah of Medicine" — a science, alas, overstocked with Messiahs. Bouillaud rendered eminent service to our knowledge of diseases of the heart and their connection with rheumatism (though in this he was anticipated by Kreysig), as well as to the subject of the obliteration of bloodvessels. His chief works were entitled "Clinique médicale de l'hôpital de la Charité etc.", "Traité clinique du rhumatisme articulaire" etc., "Traité clinique des maladies du cœur" etc., "Traité clinique et experimental des fièvres dites essentielles". In these he shows himself an eminent physical diagnostician and the god-father of the so-called "Médecine exacte".

The number of Broussais's opponents was at first not very considerable, but it gradually increased. Many physicians of the "School" to be next mentioned in particular were included in this number. Among these Auguste François Chomel, professor of pathology in the École de Médecine at Paris and chief physician to the Hôtel Dieu, who will be again mentioned, was prominent from the outset. The same may be said of the famous Hallé, who has been already mentioned, and who declared that one could smell the pride of the sectary in the very style of Broussais. We should also mention Fouquier, François Emmanuel Fodéré (1764-1835), from 1814 professor of forensic medicine and hygiene in Strassburg, and author of the first French work on these subjects, who rendered good service to the doctrine of epidemic diseases, and has been already noticed in our account of the medicine of the 18th century; A. Coste, Fr. Dubois and others. In Denmark the doctrine of Broussais was opposed particularly by Karl Otto (1795–1879), professor of forensic medicine and pharmacology in Copenhagen. He was a native of the island of St. Thomas and made his début in the rôle of a writer of travels, but devoted himself to phrenology, the temperance question, and finally, after resigning his professorship, to freemasonry. In Germany the earliest opponent of Broussais was Heinrich Spitta (born 1799), professor in Rostock; he was followed by the famous Franz Paula von Gruithuisen (1774–1852), professor successively of medicine, the natural sciences and astronomy in Munich; W. H. Conradi and others. On the other hand C. M. Bailly and the Italian Campagnano endeavored to combine the doctrines of Rasori and Broussais — theoretically to improve the treatment of suffering humanity, but really in the interest of therapeutic maltreatment. Alas, in the history of medicine how many doctrines have been welded together, to occasion in practice only the utmost misery of the poor patients!

Contemporaneous with the foregoing school of medicine, and its antagonist in all respects so long as it survived, was the

f. French (Paris) School of Pathological Anatomy and Diagnosis,

which has given tone to the whole medicine of the 19th century. Hence its consideration among the schools of medical thought is necessary, inasmuch as it manifested itself far more as a prolonged and wide-spread tendency in pathology, than in pure and macroscopic pathological anatomy. In other words, since it taught us for a long time to look upon pathology as pathological anatomy, while aiming to elevate the latter science into "a clinical anatomy" and making it the duty of the physician as regards his patient to search for changes in the pathological anatomy and to investigate the local products of disease. To medicine, however, it assigned the duty of removing these products, instead of the causative morbid processes, which latter were utterly neglected. The living patient became a subject for pathologico-anatomical and local diagnosis and for local therapeutic investigation, or for simple expectant and general treatment. Many diseases, therefore, were regarded as incurable, since the products of processes which had run their fatal course were observed and studied more than the process of healing. No indications were laid down. The ability, indeed almost the desire, to cure diseases was weakened. If in the purely expectant treatment the vital activity, designated the vis medicatrix naturæ, was at first left to work undisturbed, in later times the newly discovered alkaloids were administered with great freedom; indeed their employment was pushed to abuse, since it is undecided whether such powerful remedies permit nature to work undisturbed. — Functional or dynamic disturbances were disregarded, and even the diseases of the fluids of the body were at first almost utterly forgotten, both errors resulting from the fact that these diseases could not be found in the cadaver by the knife etc. The patient, on the whole, was treated rather as a living cadaver or a living anatomical preparation, not as a sentient being, endowed with vital forces. To this statement a few physicians only of this school — e. g. Andral — form an exception. Thus the study of the dead (on the living) was pursued, and the charge which Asclepiades once made falsely against Hippocrates was revived, this time indeed upon new grounds. As the proper processes of disease were neglected, so etiology, and, for a long time at least, prophylaxis or hygiene, shared their fate.

"In France everyone experiments with the sick, less to attain the best method of cure, than to enrich science with an interesting discovery and to advance a step the accuracy of diagnosis by some new physical sign. Foreigners are not wrong when they say 'In France the physician treats rather the disease than the patient'" (Emil Kratzmann, died 1876).

If practice in this way lost in efficiency and value, on the other hand our knowledge of the changes produced in the body by disease was undeniably promoted, both by post mortem examinations and the so-called physical aids invented for the investigation of the products of disease in the living. The pure diagnosis by means of the senses was cultivated incomparably more carefully and certainly than in earlier days, but it was accomplished less by means of the ordinary senses than by the aid of percussion, urometry, mensuration, microscopy (only slightly), chemical investigation etc.

In both ways the seat of many products of disease was discovered with an acuteness and accuracy heretofore not dreamed of. Accordingly a great number of localizations of disease were looked upon as new diseases and assigned new names, and the latter henceforth appear instead of the earlier vague and general designations, which had regarded disease as a totality with local results. (Thus e. g. the collective term "asthma", which is now divided into local classes.) Conversely, from this time forward the new school recognized local diseases alone, and derived the changes in the general condition from these. Indeed "the local diseases were looked upon as more or less sanative efforts of nature to resolve in some way or another some sort of general difficulty (dyscrasia), and not as limited and local inflammatory processes." The latter idea was first developed when a "new humoral pathology" was called into life by the school.

This separation into concrete individual diseases according to the recognized localization was especially promoted by the specialism which arose almost necessarily when the mass of "exact" facts and discoveries, simply registered, became so large that one individual was no longer able to master all of them in the department of every organ. Undoubtedly this was, in many respects, a beneficial division of labor for scientific study. But to medical practice, which has always to deal with the whole man, and which cannot and should not consider single and separate departments, the transmission of specialism (save some few branches) was manifestly injurious.

Moreover the school promoted the overgrowth of the study of cases

(Casuistik), as well as the scientific specialism which results therefrom, while specialism in practice took root in the Paris school far less than in its German successor. The so-called "interesting cases" were specially studied, while, on the other hand, the everyday matters, with which ordinary practice (in contrast to hospital practice) has most frequently to deal, remained neglected. Hospital practice now became predominant, and separate departments arose for diseases of the chest, the skin etc. At these clinics, however, brilliant diagnoses were the chief aim, the best marked and the rare cases were cultivated for this very reason, while those in which an anatomical localization could not be established with the stethoscope, pleximeter etc. were pushed aside, almost like fables of an earlier and unscientific period.

The seductiveness of the anatomico-diagnostic and pathologico-anatomical knowledge so greatly advanced, promoted still further a one-sidedness, which finally culminated in the arrogant belief that medicine really originated in the anatomical school of Paris. Before it there was supposed to have been no medicine, or at least no *science* of medicine. This for a long time passed for an axiom, and produced the same effects as the theoretical dogmas of earlier systems, and it was only at a later period that the conviction began to be expressed that this school too, as had so often happened in the history of medicine, had taken a part for the whole. The past was utterly ignored, and everything not acquired by the newest aids of knowledge and not of to-day, was regarded as superannuated. Thus this school isolated itself entirely from the earlier medicine, to which it was inclined to deny even the capacity for correct observation.

In order, however, to gain general conclusions from the immense collection of observations, in which general principles were supposed to take no part (observation alone, and not thought *per se*, might claim recognition and value), Louis and others subsequently called in the aid of statistics. In this way many valuable results were, indeed, obtained, but very often too, in consequence of too small a number of cases, or from combining those taken under the most different relations and in the most varied localities, without the certainty of an always accurate diagnosis etc., results and consequences ensued, which were frequently again overthrown by subsequent statistics. Hence arose much uncertainty, particularly in therapeutics, whose results were also submitted to the numerical method, though in this branch certainly very little equality in the basis of classification was to be obtained, and the statistics often bore upon their face, (and still bear) the evidence of unconscious or conscious deception. — Moreover the school rendered good service in doing away with over-medication, a practice which of late seems disposed to reappear.

Physiology and microscopic anatomy were not cultivated by the French anatomical school until a later period, and deductive thought was of course utterly excluded as inadmissible in "exact" medicine, or the so-called Positivism.

A short but pregnant characterization of the tendency of the French school is furnished us by Isensee (1844), one of its great admirers: "Let us consider now briefly the French medicine of the present day and its therapeutics. The French physician who stands at the bedside of a patient behaves as follows: he looks upon him, and, with a thorough knowledge of anatomy, divides his body into the systems of Bichat. Reasoning then more or less after the manner of Broussais, he assumes that one of these systems is suffering from inflammation. Which system this is, where is the seat, what the extent and the grade of the inflammation, he investigates with every sense, especially by touch and with the aid of the stethoscope and percussion, with a precision in which Louis is a master. Then he orders the withdrawal of solid food, more or less gentle remedies, and antiphlogistic and revulsive treatment. If death ensues, he investigates by means of the pathological anatomy how far his diagnosis (not his treatment) may have been correct, in accordance with the precise details furnishes by Andral, Cruveilhier and numerous other authorities." Wunderlich, however, reported that "in chronic cases still less therapeutic interference was admitted than in the acute", and he says further, "there we rejoice in an exemplary precision in the examination of patients, and convince ourselves how frequently the affections of these organs, heretofore regarded as dynamic, depend upon material charges, and how often the latter accompany and form the basis of other troubles where it had not been heretofore anticipated. I recall here only the heart affections in dropsy and in acute rheumatism."

In such demonstrations as that last mentioned lay the strength of the school, while its weakness is manifested in the account first quoted.

The greatest injury inflicted upon medicine by this school was the fact that it made its "hobbies", advanced with such pretensions of infallibility, accepted as so many actual and unique "acquisitions" — and as such they were everywhere received. By such pretensions it verified the saying that it is only necessary to have confidence in one's self in order to make others have confidence in you. Undoubtedly, however, the school was of permanent advantage to medicine by its eminent promotion of our knowledge and understanding of the changes occasioned by morbid processes, and by its simplification of medication.

But among the representatives of this school there prevailed absolutely no agreement in their views: some were Solidists, others inclined to humoral pathology or cultivated both of these systems together, and others still were pure Eclectics.

Bichat and Pinel, as well as Prost in his "Médecine éclairée par l'observation et l'ouverture du corps", were forerunners of this school. Its proper founders, however, were Corvisart, Dupuytren and Laënnec, both the latter pupils of Bichat and Corvisart. In our consideration of the advances in diagnosis and surgery we shall have to return to these physicians, and we will only mention here that Laënnec is regarded as the founder of general pathological anatomy, though Dupuytren likewise claimed this honor. Here we should mention also

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1. The influence of this school upon Germany may be inferred readily from the fact that almost all its works were at once translated, and the booksellers had their own translators, e. g. Dr. Behrends for Hirschwald, Dr. Krupp for Kollmann in Leipsic, Dr. Eckstein for Kaulfuss in Vienna etc.

Gaspard Laurent Bayle (1774–1816), of Vernet in Provence, who, though originally designed for theology, turned his attention to law and finally to medicine in Montpellier. Occupying for a long period the position of an army-physician, he then became physician-in-ordinary and physician to the Charité, where he rendered eminent service by numerous investigations of the pathological anatomy of pulmonary consumption, a disease from which he himself died. He is also specially distinguished for his investigation of gray miliary tubercle, to which he first gave this name, and which he regarded as a neoplasm. In this he was followed by Laënnec, who distinguished miliary tubercle and tuberculous infiltration, and, like the later Andral, Dance and others, held phthisis to be contagious.

Bayle, at Corvisart's clinic, was the first to apply the ear to the naked thorax in diseases of the heart (feeble pulsation), and thus became the predecessor of Laënnec.

The new direction of French pathology was also followed by the famous old clinician

Auguste François Chomel (1788–1858) of Paris.

Chomel was from 1826 a professor in the medical faculty of Paris, physician to the Charité and the Hôtel-Dieu, and ordinary physician of Louis Philippe. After the coup d' état of Napoleon III. he was dismissed because of his unwillingness to recognize the new order of things. He rendered special service to medicine by his doctrine of typhus fever, and is the god-father of typhoid.

Chomel for a long time did not belong to the new school, and even in his later days did not subscribe to all of its teachings. For instance, he employed auscultation and percussion less than the other representatives of this school, and Piorry's pleximeter he could not endure. On the other hand he practised mensuration (compas d'épaisseur). He did not defend the stand-point of pathological anatomy until after the publication of his first works ("Essai sur le rhumatisme", 1813; "Traité des fièvres et des maladies pestilentielles", 1821; "Élémens de pathologie générale," 1817) and in his "Leçons de clinique médicale", Paris, 1834.

Fouquier, at the Charité, Piédagnel and Jean Bapt. Delaroque (1787–1858), all of whom were less eminent physicians, occupied themselves with the subject of typhus.

The surgical and pathological anatomist and surgeon

Gilbert Breschet (1784–1845) of Clermont-Ferrand,

professor in Paris, embraced more decidedly the anatomical and diagnostic tendency. He established the existence of phlebitis, and showed its results and its frequency.

Finally we should mention the eclectic practitioner,

Léon Rostan (1790–1866), of St. Maximin in the department of Var, physician to the Salpêtrière and from 1833 professor of the clinic at the Hôpital de l' École and then at the Hôtel-Dieu. He was at first undecided between the old and the new school, but finally lent his authority to the latter in his works on "Ramollissement du cerveau" and his "Cours de méd. clinique" in three volumes, works in which he embraced the localizing tendency not only in diagnosis but also in therapeutics.

One of the earliest, and certainly one of the most ingenious pathological anatomists and representatives of the pathologico-anatomical tendency in Paris, the first occupant of the chair of pathological anatomy erected in Paris in 1835 at the expense of Dupuytren, was

Jean Cruveilhier (1791–1873) of Limoges,

at first professor in Montpellier and then in Paris. In the latter city he revived the Société d' Anatomie founded by Bichat, and became in 1836 chief physician to the Maternité. Cruveilhier was a pupil of Dupuytren, who induced him to pursue the study of pathological anatomy by repeatedly recommending to him this subject in response to the question upon what he should write his dissertation. His "Essai d' anatomie pathologique" (1816) was the fruit of this advice. This work was followed by his "Médecine éclairée par l'anatomie et la physiologie pathologique". (1821); his famous "Anatomie pathologique du corps humain", with numerous magnificent plates, 1830–1842, and his "Traité d' anatomie pathologique générale", 1849–64, with other works. Cruveilhier did not yet cultivate microscopic anatomy. In 1867 he resigned the chair of pathological anatomy to Vulpian. His son Edouard Cruveilhier is to-day one of the best known surgeons of Paris.

Cruveilhier, who, like Morgagni, associated the changes in pathological anatomy with the observations made at the bedside, divides the former into variations of form or mechanical disturbances, and abnormalities of substance. To the latter belong the neoplasms, which he divides into homologous and heterologous. The homologous neoplasms again are divided into those produced by the metamorphosis or exchange of a tissue, e. g. into cellular tissue, bone substance etc., those dependent upon proliferation or overstepping the normal limits of a structure, e. g. exostoses, condylomata, and finally those which are to be regarded as peculiar or independent, e. g. lipomata, fibrous tumors. Heterologous tumors are, on the one hand, either permanent, consisting of either simple exchanges of tissue or proliferations or peculiar forms, or they may be transitory, in which class belong the eruptions. Cruveilhier established further a class of inflammations, to which belong gangrene and atony, and a class of neuroses and fevers. He investigated the different steps of development and not simply the final product. The changes in homologous, as well as heterologous neoplasms arise from exudates into the tissues, which are either expelled by inflammation, or lead a proper life of their own, like parasites, or without standing in connexion with the neighboring tissue, simply supplant the latter.

Cruveilhier's teachings regarding pyæmia and phlebitis, which latter disease had been studied before him by John Hunter first in 1784, then by Joseph Hodgson (1815) and J. B. H. Dance (1828), excited great attention. He regarded pyæmia as always the result of phlebitis, referred the latter disease to an original coagulation of the blood, and concluded one-sidedly that phlebitis (capillary phlebitis) was the general cause of almost all inflammations. His maxim "Phlebitis rules the whole of pathology" reminds one of Broussais. Cruveilhier was the first to observe that primary suppurative phlebitis does not occur, but that this disease was always preceded by a coagulation of the blood, and in the middle of this coagulum the pus first made its appearance. Nevertheless he assumed that this pus was formed originally upon the walls of the veins, and then migrated by the force of capillarity into the middle of the coagulum, for he still regarded pus as a fluid without corporeal elements. Accordingly for Cruveilhier phlebitis was, indeed, the ultimate cause of pyæmia, but the pus first made its appearance in the blood from the coagulum which preceded the former. This doctrine, as we know, was first rectified by Virchow.

In the struggle against Broussais a prominent part was taken by

M. Augustin Nicol. Gendrin (born 1796) of Chateaudun,

physician to the Hôpital Cochin and then to the Hôpital de la Pitié, and editor of the "Journal général de médecine" etc. In his "Recherches sur la nature et les causes prochaines des fièvres" (1823), his "Histoire anatomique des inflammations" (1826) and his "Traité philosophique de médecine pratique" (1838–41), he assailed the doctrines of that Messiah from the stand-point of pathological anatomy. Gendrin was one of the first pathological experimenters (injection of sanies). He also practised ausculation and percussion of the head ("Leçons sur les maladies du cœur" etc., 1840–41).

But the ablest representative of the new school, who by his talents as a lecturer and teacher, and particularly by the reputation and splendor of his works, elevated Paris to the position of the Mecca of the new doctrine, where foreigners, and especially Germans, made their pilgrimages in crowds and sung at home more or less enthusiastic stories concerning Parisian medicine, was

M. Gabriel Andral (1797–1876) of Paris, the most indefatigable investigator and thinker of this school.

Andral was the son of Guillaume Andral, Murat's physician-in-ordinary, and from 1828 professor of hygiene, 1830–39 of internal pathology, and then Broussais's successor in the medical clinic at Paris. In consequence of an affection of the heart however, he withdrew early (1856) from active exertion as a teacher. His first observations he collected (though as he said without any view of making them the foundation of his chief work) at the clinic of Corvisart's famous pupil Théodore Nilamond Lerminier (born 1770 at St. Valérie in the Somme), imperial court physician and then director of a division in the Hôtel-Dieu and finally in the Charité. These observations Andral published under the title "Clinique médicale, ou choix d' observations recueillies à l' Hôpital de la Charité" (1823–1840). The five volumes contain descriptions of diseases of the thoracic organs and those of the abdomen, with typhus and diseases of the brain. Andral also wrote: "Traité d' anatomie pathologique", 1829; "An antiquorum doctrina de crisibus et diebus criticis admittenda?", 1824, and in 1837 appeared under the editorship of Amédée Latour his "Cours de pathologie interne" In conjunction with Gavarret he also wrote several treatises on the blood, and finally with Gavarret and de la Fond, his "Essai d' hématologie pathologique", 1843.

The course of Andral's investigations, and his eclectic, eminently critical mind, may be well judged from one of his sayings preserved by **Kratzmann**:

"I have now (1840) begun medicine several times from the very beginning. The first time in my studies concerning pathological anatomy; the second on the occasion of my investigations in the sphere of auscultation and percussion, and the third in my physical and chemical investigations of the different fluids of the body. I scarcely think this will be the last time."

This quotation likewise gives us an outline of the general course of development of the school, whose followers embraced first the pathological anatomy offered by Bichat, Corvisart and others, then the tendency to physical diagnosis called into existence by Laënnec, and finally the chemico-physiological inquiry originated by Andral and Gavarret, as well as Magendie. As the result of the latter Andral again advanced humoral views, and in accordance with these taught, in opposition to Broussais, the existence of primary diseases of the blood, the so-called dyscrasiæ. He drew physiology into the service of pathology, elevating the latter "to a pathological physiology", and was the creator of hæmatochemistry, designed to complete the earlier iatrophysical or Boerhaavian hæmatophysics. In this he was supported by the numerous investigations of Lecanu and Denis, and the eminent labors of E. Becquerel (1804–1878) and Rodier. Andral investigated not only the secretions and excretions, including the respired air, but also the exudates and solid pathological products. To disturbances of function without material alterations in the parts he at first accorded no recognition, but finally admitted a kind of "vitality". — Inflammation Andral divided into hyperæmia, suppuration and secretion, and he admitted that its extension might take place through either the blood or the nerves, for in general he did not assign distinguishable rôles to either the fluids or solids in the life of bodies.

In therapeutics Andral again laid great weight upon emetics and cathartics, even in typhus, but, in contrast to Broussais, he ascribed little importance to abstraction of blood or venesection. He also investigated chlorine and iodine and its compounds anew. Moreover he frequently administered, on the contrastimulant system, large doses of tartar emetic, aconite, digitalis, camphor (particularly in enemata) etc. On the whole, however, he was a defender of the do-little or do-nothing system — expectant treatment, as he named it — for therapeutic teaching has ever been the weakest side of the French (in contrast to the English), who have always inclined to one-sidedness, routine or fashion.

The chemico-diagnostic or pathologico-chemical tendency did not gain in France the same extension as it did in Germany, though reagents like litmus-paper etc were employed tolerably early. Its chief representatives were Andral and Gavarret. Robin (Traité de chimie anatomique et physiologique, 1853, with an atlas of colored plates), Bouchardat (1806–1886), a member of the Académie de Médecine, chief pharmaceutist of the Hôtel-Dieu and professor of organic chemistry in Paris and, V. A. Racle (Traité de diagnostic médicale). Mialhe was distinguished as a pharmacochemist and pharmaco-dynamist.

M. Andral devoted much attention to the history of medicine and lectured upon this subject. Though a weighty opponent of Broussaisism, he still recognized the ability of Broussais, whose successor he had become. This was much less the case with the second important representative of the new school, the "Heros exacter Minutiosa" (Isensee),

Pierre Charles Alexandre Louis (1787–1872), who was the first to apply the "numerical method" to pathology, and who properly brought about the downfall of Broussais, with whom he exchanged polemical writings.

From the 17th to the 33d year of his life Louis was in Russia, where he had pursued his studies. He accidentally returned to Paris in 1818, when Broussaisism was in its bloom, and remaining there began to make observations at the clinic of Chomel, to enumerate and to dissect, with the object of subjecting the doctrines of Broussais to the proof. To this object he devoted four to six hours daily for seven years, spending his time in the hospital and the dissecting room, and it was not until 1825 that he published his "Recherches anatomiques, pathologiques et thérapeutiques sur la phthisie", founded upon 358 dissections and 1960 cases of the disease. This work was followed by "Mémoires", "Recherches anatomiques, pathologiques" etc. on various diseases, "Recherches . . . . sur la maladie connue sous les noms de fièvre typhoïde, putride, adynamique", a famous polemic "Examen de l' examen de M. Broussais" etc., and other writings, all of them based upon physical and other forms of diagnosis practised with the most scrupulous accuracy, as well as upon dissection and enumeration The latter system he employed in etiology, symptomatology, prognosis, therapeutics and pathological anatomy. By all these labors Louis, who in 1835 was appointed physician to the Hôpital de la Pitié, became one of the leaders of the school.

His principles are expressed in the following extracts: "As often as I have formed an à priori idea and have afterwards had an opportunity to prove the facts, I have invariably found that my idea was false." "In pathology, as well as in therapeutics, numerical analysis is a useful practice. By numbers only can we ascertain the frequency of this or that symptom; by a definite enumeration alone is it possible to utilize the special relations of age, sex and the constitution of our patients, for the settlement of the proposition that this or that symptom occurs in any disease 10, 15 or 50 times in 1000 cases." To attain mathematical accuracy in questions of this kind is certainly impossible. Louis forgot the changing idiosyncrasies of the subjects of our art (upon which even Hippocrates laid stress), as well as the Baconian maxim, "All induction from simple enumeration is child's-play; its conclusions are assailed, its decisions insufficiently grounded, and thus it is exposed to an easy overthrow." "By means of statistics only are we able to find an average number, from which we may conclude as to the frequency or the duration of a symptom, or of an entire disease, and finally as to its crisis." The latter may, indeed, be determined quite easily numerically, while the consequence must turn out uncertain, since no two cases of one and the same disease are entirely similar, and even similar individual cases react differently under the same treatment. (By the way the belief that one must always carry out and maintain the same treatment in diseases because of the results of statistics, without individualizing sufficiently each special case, leads to great routine in therapeutics.) "In therapeutics the numerical method is the only one which suffices to decide the advantages of two methods of treatment of. one and the same disease." Here it must be taken for granted that the disease always occurs in individuals of similar constitution, the same age etc., in order to attain results mathematically indisputable. In therapeutics Louis also fell into mistakes from the fact that he had his eye fixed upon hospital practice only. — For instance he discarded blisters unfairly as increasing fever, censured large bleedings etc., but gives in pneumonia large doses of tartar emetic in addition to free bloodletting etc.

How "unexpectedly" dry and jejune were Louis' registrations of pathological facts may be judged from the following extract: "The small intestine in typhus was greatly inflated in 14 cases, the mucous membrane. filled with elliptical plaques, was white in probably a third of the cases. red in 17 cases, grayish in 11, in good condition in one fifth of the cases. softened in various degrees in the other cases" — all as we see relative ideas and expressions, which exclude a strictly mathematical method admitting only absolute similarity or at least precise characteristics. and in its place merely rendering possible the appearance of the greatest scientific precision and certainty. This was affirmed by Double, for, after the appearance of the numerical method in France, lively disputes concerning its value began among the more important physicians, and the final settlement of this question has not been reached even at the present day. In diagnosis Louis employed all the modern aids, even counting the pulse most accurately with the assistance of the watch marking seconds. In fact the use of the watch in observations upon the pulse was chiefly promoted by Louis, though Floyer began the practice with his watch marking minutes, and Haller had introduced the practice into Germany — Louis' stethoscope was short, and his pleximeter was made of caoutchouc.

Statistics in medicine, or the principles of numerical prognosis, therapeutics, etiology etc., were elaborated in accordance with the principles of probabilities and the higher mathematics by

JULES GAVARRET (born 1816) professor of medical physics in Paris, in his "Principes généraux de statistique médicale, ou développement des règles qui doivent présider a son emploi", which appeared in 1840, and through the influence of this work the numerical method continued to increase in diffusion, though up to the present time it has not brought to light any correspondingly practical and useful results, either in etiology, therapeutics or prognosis.

Yet as regards the frequency of the appearance of diseases and the ultimate cause of death, and above all as regards the pathologico-anatomical changes shortly before death, particularly in epidemic, as well as merely contagious diseases, many valuable data have been acquired. But the practical and exceptionally important relations of soil, residence. clothing, food, meteorological and corporeal constitution, and many other things are, for the most part, entirely passed over in statistics. Moreover the figures obtained from all countries must be often deceptive in consequence of the endless differences of the registrars in the gift of observation, in zeal, care, interest and scientific conscientiousness, so that the great number of observers rather increases than diminishes the sources of error. To this it must be added that statistics are of no benefit for individual cases in practice, for although we do, indeed, regard their general results, we cannot apply them individually and base our treatment upon them. — J. Pelletan also was a representative of the statistical tendency. and in particular furnished some statistics of pneumonia, while J. Ch. M. Boudin discussed not only statistics but also geographical pathology ("Traité de géographie et de statistique médicale etc.", 1857).

Next to Andral and Louis,

François Magendie (1782 or 1783–1855) of Bordeaux, professor of general pathology in the Collége de France and physician to the Hôtel-Dieu, was a most important representative of the new French medicine, and thus of the medicine of our century. Indeed as an experimenter Magendie marks an epoch in the history of our art.

Above all as an eminent and skilful, though often unsystematic and unnecessarily cruel, experimental physiologist, Magendie introduced the experimental method into pathology and pharmacology, and thus largely developed experimental pathology and the most modern experimental pharmacodynamics. The latter science occupies itself chiefly with the alkaloids, of which Magendie introduced a large number into practice. He sought to reduce medicine (except nervous activity, in which he admitted the existence of a vital principle) to physiologico-chemical and physiologico-physical laws. For this purpose he cultivated "experience without any admixture of reasoning" (Guardia), and this experience with Magendie was equivalent to the results of physiological and pathological experiments or vivisections. Of the latter Guardia says that they were performed so frequently in France "pour être cité en Allemagne". But "he had not yet the discernment, nor did he require, to make his experiments exact in volume and weight" so "that he has not yet attained the highest grade of precision" (Wunderlich). Magendie was a solido-humorist in pathology, a most accurate diagnostician, but "almost too simple in his therapeutics". As the result of Magendie's own experiments, and of the injections of ichor into the veins, instituted, as his suggestion, by Gaspard (1822, Mémoires sur les maladies, purulentes et putrides in the Journal de Physiologie, tome II), Dupré (ibidem, 1823), Légallois, M. A. N. Gendrin, Dupuy and F. Leuret (Haller had already done the same thing), pyæmia, ichorrhæmia and metastases, in the modern signification of that term, were introduced into pathology. Magendie's chief works were entitled "Précis élémentaire de physiologie" (1816); "Mémoire sur le vomissement"; "Formulaire pour l' emploi et la préparation de plusieurs nouveaux médicaments" etc. (1821); "Leçons sur les functions et les maladies du système nerveux" (1839); "Leçons sur les phénomènes physiques de la vie" (1835), etc. We owe to him also our knowledge of the foramen Magendie in the pia mater, near the vermiform process. — The tendency to experimental pathology was likewise pursued by Fred. Dubois (Préleçons de pathologie expérimentale, Paris, 1844), and by the famous specialist in the diseases of children and author of the "Clinique médicale de l'Hôtel-Dieu de Paris" (1861),

Armand Trousseau (1801–1866) of Tours,

professor in the Faculty of Medicine in Paris and physician to the Hôtel-Dieu. Trousseau rendered especial service to medicine by his study of the subject of croup and the employment of tracheotomy in this disease, though the operation as performed in the Hôpital des Enfants Malades in the years 1850–1857 resulted in only 86 recoveries out of 398 operations. Other works from the pen of Trousseau were the "Traité de thérapeutique et de matière médicale, par Trousseau et Pidoux", 1841, and "Traité pratique de la phthisie laryngée, laryngitis chronica etc., by Trousseau and Bellocq, 1837.

The new tendency in pathology was likewise embraced by Récamier, Double (Séméiologie générale etc.), who investigated the subject of phlebitis, Dance (Guide pour l' étude de la clinique etc., 1834), Dalmas, Fournet, Guersant, Coutanceau, Calmeil, Rouchoux, Guéneau de Mussy, Honoré, Husson, Jadioux, Grisolle (1811–1869; Pneumonia), Marc d' Espine, Caillard, Aran, Latour, Monneret (author of the remarkable criticism that Skoda's work swarmed with errors and defects, whose rectification was the business of the clinic), Lombard, Ulysse Trélat and numerous others.—Constant Saucerotte and Risueno d' Amador, professor in Montpellier, were critics and historians of the pathologico-anatomical tendency. (Quelle a été l' influence de l' anatomie pathologique sur la médecine depuis Morgagni jusqu' à nos jours?, 1837, and the work with the same title by Amador in the same year.) The same may be said of Louis Peisse and finally of P. V. Renouard (1861).

Claude Bernard (1813–1878), of St. Julien near Villefranche (Department of the Rhone),

the successor of Magendie, was a famous experimentalist in pathology as well as physiology (Leçons de pathologie expérimentale, 1871). Originally a tragic poet, he finally turned his attention to the natural sciences and to medicine. In 1854 he was appointed professor of general physiology in the faculty of the natural sciences, and in 1855 in the Collége de France. In 1869 he became a member of the Académie and Senator. His numerous works relate to the digestion of fat by the aid of the pancreatic juice, the formation of sugar in the liver, the production of diabetes by puncture of the fourth ventricle, division of the sympathetic etc., etc. In opposition to Magendie he maintained the conformity to law of the phenomena observed in the organism, and the legitimateness of our knowledge of these laws obtained by experiment, while Magendie would confine these to inorganic nature (Introduction a l' étude de la médecine expérimentale,[1] Paris 1865). In 1885 a monument to Bernard's memory was erected in the University of Paris.

Pierre Bretonneau (1771–1862) of Tours

in 1826 studied the subject of "diphthérite", though the same had been done already by T. Capuron and Louis Turine (1751–1819) of Geneva (croup). Bretonneau, however, did not distinguish it from croup but regarded both as a nosological unity with different localizations. He denied the gangrenous character of diphtheritis and performed the first successful tracheotomy in croup. According as it appeared upon the mucous membrane of the pharynx, the larynx, the surface of wounds etc., he regarded diphtheria as an angina maligna, a croup, hospital gangrene etc.

C. P. Forget (died 1861),

professor in Strassburg, wrote on the diseases of the heart, on naval medicine etc. Hermann Lebert (1813–1878) too, who displayed his activity first as a pathological anatomist and particularly as a pathological microscropist in Paris, and subsequently as a famous clinician in Breslau, belongs to this school by virtue of a number of valuable works. Béhier (1814–1876) is likewise to be mentioned as a famous clinician of the Hôtel-Dieu.

A result of the French tendency to pathological anatomy, to be regarded in many respects, and especially in a practical point of view, as an unfortunate outgrowth, was the cultivation of specialties which accompanies its termination and includes its offshoots. This cultivation made its appearance at an early date, and the tendency subsequently spread to other countries, but particularly to Germany, so that at last there is scarcely any organ of the body which has not found, not its special scientific students (which is perfectly proper), but likewise its special representatives in practice. In the latter point of view the question is frequently merely one of new sign-boards, though the practice leads to one-sidedness. Moreover, through the specialism introduced from France, the position of German physicians has been gradually undermined, and the public conception of the profession has certainly been partially degraded to that of a trade in the art of healing.

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[1] A work which exercised great influence, and is said to have even justified the realistic "smuttiness" of Zola and his companions in their romances. The latter, however, invented the "roman expérimental", whose nudities and brutalities are palliated and ostensibly necessitated by Claude Bernard's remark : "If I wished to express my feeling of the science of life, I should say it is a noble salon, glowing with light, to which one can go only by passing through a great and disgusting kitchen."

In France C. M. Billard (died 1828) cultivated within the anatomical school the specialty of the Diseases of Children in his "Traité des maladies des enfants nouveau-nés et à la mamelle, fondé sur de nouvelles observations cliniques et d' anatomie pathologique, faites à l' Hôpital des Enfants Trouvés de Paris", 1828. He was followed by A. Berton (Traité des maladies des enfants, ou recherches sur les principales affections du jeune âge, 1837); F. L. J. Valleix (1807–1855; Clinique des maladies des enfants nouveau-nés", 1838); Rilliet et Barthez (Traité clinique et pratique des maladies des enfants, 1838–1848); Duparque (Nouveau traité pratique des maladies des enfants depuis la naissance, 1838); Richard de Nancy (Traité pratique des maladies des enfants, 1839); the "Clinique des hôpitaux des enfants", edited by Vanier (1841), in which Guersant, father and son, Jadelot, Baudelocque, Bouneau, Baron, Blache, Thévenot de St. Blaise, Auvity, Donné and J. B. Bousquet took part; Alf. Becquerel[1] (1814–1862; Traité théorique et pratique des maladies des enfants, spécialement considérées depuis la fin de la première dentition jusque' à l' âge du puberté, 1842); E. Bouchut (Traité pratique des maladies des nouveau-nés, des enfants à la mamelle et de la seconde enfance, 7th edition 1873); and Alex. Donné (died 1878), rector of the Académic de Montpellier (Conseils aux mères sur la manière d' élėver les enfants nouveau-nés, 1869); J. H. A. D'Espine and C. Picot (Manuel pratique des maladies de l' enfance, 1877); Brochard (1812–1882), a famous specialist in the diseases of children at Paris, and others. In this specialty particularly the modern means of investigation were very useful in the attainment of accuracy in diagnosis, and here too the French rendered excellent service.

Diseases of the Liver were discussed in common by Ollivier, Adélon, Ferrus and Bérard (1828).

Diseases of the Chest and Heart, after the example of Laënnec, of course found a particularly large number of students, among whom were almost all the coryphæi of the school, Lombard, Bouillaud, Andral, Piorry Monneret, Grisolle, Beau, Forget etc.

The Diseases of Old Age, after Gendrin had ventilated the question of the influence of various ages upon diseases, formed the subject of works by Hourmann, R. Prus, M. Durand-Fardel (in his famous "Traité pratique des maladies des vieillards", 2d edition 1873), Reveillé-Parise (Traité de la viellesse, 1853) etc.

Diseases of the Skin were studied as a specialty in France at a very early date, inasmuch as they could be observed in separate hospitals (Hôpital de St. Louis) and hospital wards. The labors of Jean Louis d' Alibert (1766–1837) in this department began even in the 18th century — he was appointed professor in 1821 — and the same may be said of the Grison Laurent Biett (died 1840), who was an eminent pathologist, diagnostician and therapeutist of empirical tendencies in the main, but enjoyed a European reputation in his specialty (Abrégé des maladies de la peau etc., 1829; 4th edition 1847). Most of the French dermatologists named below proceeded from

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[1] Not to be confounded with the famous physicist Ant. César Becquerel (1788–1878), his father, who was so deservedly eminent for his investigations relative to animal heat and electricity, as well as medicine.

Biett's school. Biett himself was educated in the doctrines of the Englishmen Willan and Bateman, and he preserved their classification. His lectures were published by P. L. Alphée Cazenave (1802–1877) and H. E. Schedel in 1828, and those of Cazenave himself by Maurice Chausit (Traité élémentaire des maladies de la peau d'après l'enseignement théorique et les leçons de Cazenave). Biett's successor was Gibert (died 1866: Leçons sur les maladies de la peau, 1834). Pierre François Ol. Rayer (1793–1867) of the Charité, who also devoted special attention to diseases of the kidneys, likewise enjoyed great reputation as a dermatologist (Traité théorique et pratique des maladies de la peau, with colored plates, 2d edition 1835). Another important specialist in diseases of the skin was Giraudeau de St. Gervais (Guide pratique pour l'étude et le traitement des maladies de la peau, 1842). J. G. A. Lugol, physician to the ward for scrofulosis in the Hôpital de St. Louis, gave special prominence to the constitutional side of the etiology and therapeutics of diseases of the skin, and, like Lepelletier de la Sarthe, devoted his attention to the study of scrofula, dividing it nosographically into tuberculosis, catarrhal, cutaneous, cellular and osseous (Recherches et observations sur les causes des maladies scrofuleuses, 1844). The famous Alphonse Devergie (1798–1879) too, who distinguished himself chiefly in forensic medicine, was an important worker in diseases of the skin at the Hôpital de St. Louis, where Bazin (1808–1879) likewise labored. L. V. Duchenne-Duparc (Traité des maladies de la peau, 1859), Felix Rochard (1860), Hardy (Leçons sur les maladies de la peau, 1859–60), where also eminent specialists in diseases of the skin. The skin diseases of children found a special student of the second class in Cl. Caillault (Traité pratique des maladies de la peau chez les enfants, 1859).

The specialty of Syphilis is allied to that of diseases of the skin through the identity of its representatives, the chief of whom was and is Philippe Ricord (born 1800), of the Hôpital du Midi. He embraced the experimental or experimental-diagnostic tendency in his "syphilization" (practised, however, by Harrison and Hunter in the 18th century), by means of which he claims to have proven the syphilitic character of ulcers, the contagiousness of the primary chancre only, and the non-contagiousness of secondary ulcers, condylomata, cutaneous ulcers and eruptions. His ideas, however, were opposed and refuted on many hands, particularly by Cullerier (the nephew) and A. Vidal de Cassis, Cazenave, Gibert and others. Ricord has, however, cleared up in many points the subject of Syphilis, distinguished irrefutably the contagia of the chancre and of gonorrhœa, proved the latter disease to be entirely independent of syphilis etc. He went too far, however, in declaring that an indurated ulcer is a sign of a constitutional infection already accomplished, that he who has had a "specific" indurated ulcer is secure from the danger of a second etc. According to Proksch, Auzias-Turenne in 1850 was the first to successfully inoculate animals with human syphilitic virus, and then to reinoculate men from these infected animals, and to observe constitutional symptoms in the victims of these secondary inoculations. Recently Lancereaux at the Hôpital St. Antoine (Traité historique et pratique de la syphilis, 1866), Mauriac at the Hôpital du Midi, and A. Fournier at the Hôpital de St. Louis, with others, have distinguished themselves as specialists in syphilis. [In this connection we should not omit to mention the name of Léon Bassereau (Traité des affections de la peau symptomatiques de la Syphilis, Paris, 1852), whose differentiation of the genetic characteristics of the "chancroid" and "chancre", however vulnerable in theory, has proven very reliable and beneficent in practice. Paul Diday and MM. Clerc, Dron and Rollet likewise deserve notice. H.]

A further specialty particularly cultivated by the French school, and which might also be called the peculiar specialty of the 19th century, is that of the diseases of the nervous system. The French school enjoys the credit of having been the first to develop in an extended manner this department, heretofore greatly neglected. Among those who distinguished themselves in this branch were T. E. Coindet, Bricheteau (hydrocéphale aiguë, 1829), Papavoine (méningite tuberculeuse, 1830), Ollivier d' Angers (Traité des maladies de la moëlle épinirée, contenant l' histoire anatomique, physiologique etc., 1837), F. L. Valleix (Traité des nevralgies ou des affections douloureuses des nerfs, 1841), discoverer of the *points douloureux* and, like Blanche mentioned above, a victim of diphtheritic infection; Achille Foville (1799–1878) in Toulouse, a neuropathologist and alienist (Traité complet etc. du système nerveux, 1840), who was the first to ascribe intellectual disturbances to disease of the gray substance, and disturbances of motility to that of the white; Fr. Achille Longet (1811–1871), professor in Paris and an important student of the anatomy and physiology of the nervous system; Magendie (Leçons sur les functions et les maladies du système nerveux, 1839); P. Flourens (1794–1867), chiefly eminent as a physiologist and investigator of the function of the individual parts of the brain. *le nœud vital*, who demonstrated the seat of the intellectual functions in the cortical substance etc. (Recherches expérimentales sur les propriétés et les functions du système nerveux dans les animaux vertébrés, 2d edition 1842); V. Burq (1823–1884) in Paris, the famous ventilator (1850) of "metallotherapy"; Claude François Michéa (hypochondrie, 1845); Parchappe de Vinay (Recherches sur l' encéphale, sa structure, ses functions et ses maladies, 1836–38); J. A. Josat (épilepsie, 1756); Gintrac Sr. (died 1877) and É. Gintrac in Bordeaux (Cours théorique et clinique des maladies du système nerveux, 1853–59); J. Moreau of Tours (épilepsie, 1854); Trousseau (ataxie); Germain Sée (De la chorée etc., 1850); Th. Herpin of Geneva (épilepsie, 1852), who likewise died from diphtheritic infection; Durand-Fardel and Durand de Gros (épilepsie); E. Bouchut (De l' état nerveux etc., 1860); Sandras et Bourguignon (Traité pratique des maladies nerveuses, 1850); Claude Bernard (Physiologie et pathologie du systeme nerveux, 1858); Brown-Séquard his successor in the Collége de France in 1878; Paul Bert (born 1833), an emulator of Bernard, for a long period Minister of Instruction and a resident of Tonking, which city he proposed to govern, as he said, on the principles of Claude Bernard or of nervous physiology, "revancheur" and an atheist; Aug. Tripier (Manuel d' électrothérapie, 1861); Jaccoud, Becquerel, Leop. Ordenstein, a practitioner of Paris (Paralysie agitante, 1868); Paul Topinard (Ataxie locomotrice, 1864); Dujardin-Beaumetz (myelitis); Axenfeld (died 1878), professor in the Hôpital Beaujon (Traité des nevroses) and others. In recent times Jean Martin Charcot (born 1825), who has filled since 1872 the chair of pathological anatomy resigned by Vulpian, has acquired great reputation, even in Germany, as a specialist in diseases of the nervous system. — The work of G. B. Duchenne de Boulogne (1806–1875), entitled "De l' électrisation localisée et de son application a la pathologie et a la thérapeutique", Paris 1855, 3d edition 1872, gave a special impulse to the creation of a new treatment of diseases of the nervous system, and to the formation of a practical specialty of Electrotherapeutics by means of the induced current. In consequence of the lectures of Robert Remak (1815–1865) of Posen in the Charité, the new electrotherapeutics of the constant current was then crowned with the laurel in France, and accordingly met with general acceptance in Germany also. A. de la Rive wrote a work in three volumes on theoretical and applied electricity (1854–58). In the year 1860, however, appeared a French translation of Remak's "Galvanotherapie der Nerven- und Muskelkrankheiten" (Berlin 1858), in which the author in 1856 had recommended the galvanic in place of the induced current, and this was followed by a treatise "Principes d' électrothérapie" by Cyon, and the "Traité d' électricité médicale" of Onimus and Legros. But electrotherapeutics did not arouse in France the same enthusiasm as it did in Germany.

Microscopy, which has become so influential in Germany, had not from the outset so many representatives in the pathologico-anatomical school of France, and never acquired here so dominant an influence upon the course of medical ideas as it did in Germany. In later times, however, it has increased its influence and has found some students of reputation. Microscopic anatomy continued to be in France rather an accessory branch of physical diagnosis or of physiology. One of the earliest cultivators of histology was Fr. Vinc. Raspail (1794–1878), author of an "Essai de chimie microscopique appliquée a la physiologie", 1831, and one of the most important was Louis Mandl, professor of microscopy in Paris (Anatomie microscopique, 1838–57). These were followed by Alfred Donné (Cours de microscopie complémentaire des études médicales and Atlas du cours de microscopie published in conjunction with Léon Foucault in 1846). Other microscopists worthy of notice were M. Michel, professor in Nancy (Du microscope, de ses applications etc., 1857), and particularly Charles Philippe Robin (1821–1885) in Paris, the founder of histology in France and one of the editors of Littré's famous medical encyclopædia (Mémoire sur es objets qui peuvent être conservés en préparations microscopiques, 1856, Histoire des végétaux parasites, 1853, Traité du microscope, son mode d' emploi, son application etc., 1871); L. Saurel (Du microscope etc., 1857); C. Basile Morel (1823–1884) in Nancy (Traité élémentaire d' histologie humaine, 1864, with an atlas by) A. Villemin, professor in the military hospital of Val de Grâce in Paris, and the discoverer of the communicability or infectiousness of tuberculosis (1864), A. Moitissier in Montpellier, who applied photography to microscopy (La photographie appliquée aux recherches micrographiques, (1866), and the most important and recent writers Cornil and Ranvier (Manuel d' histologie pathologique, 1869–73), who incline to the cellular pathology.

Otology, which received a new and practical impulse through the catheterization of the Eustachian tubes in the 18th century, was first promoted to the dignity of a specialty by J. A. Saissy in his "Essai sur les maladies de l' oreille interne" (1827). He had been preceded by Alard with an "Essai du catarrhe de l' oreille" (1807) and by Monfalcon with a treatise on the diseases of the external ear. This specialty, however, entered upon a new phase when Jean Marc Gaspard Itard (1775–1838) was appointed (1789) special physician to the hospital for deaf-mutes. In 1821 he published his memorable work "Traité des maladies de l' oreille et de l' audition". Itard introduced into practice the injection of fluids through the Eustachian tubes, while N. Deleau, after the example of Cleland, employed the air douche by means of an elastic catheter (1828), and made this practice useful in diagnosis. P. Menière, E. H. Triquet, Simon Duplay, C. Miot, Gairal and Pétrequin developed this department still further. G. Breschet likewise rendered good service in this branch by his "Recherches anatomiques et physiologiques sur l' organe de l' ouïe et sur l' audition dans l' homme et les animaux vertébrés", 1836. Hubert-Valleroux wrote on catarrh of the middle ear (Mémoires sur le catarrhe de l' oreille moyenne et sur la surdité, qui en est la suite, 1845) and its consequences, and J. M. D'Espine "Recherches pratiques sur le traitement de la surdité" 1846. The French, however, remained behind the English and the Germans in the subject of otology. One of their most recent writers on this branch of medicine is Jean Pierre Bonnafont (Traité théorique et pratique des maladies de l' oreille et des organes de l' audition, 1860, 2d edition 1873). Prosper Menière of Paris, already mentioned, described in 1861 the disease called in his honor "Menière's disease", and Benjamin Benno Loewenberg (born 1836), an eminent otologist also in Paris, is the author of numerous works in the department of the diseases of the apparatus of hearing.

The specialty of Diseases of the Larynx, first taken up anew and practically in Vienna, was introduced into France by the works of Türck and Czermak, but has not met with the same popularity here as in Germany. It was cultivated particularly by the Hungarian L. Mandl (1813–1881) in Paris (Traité pratique des maladies du larynx et du pharynx, 1872), and Émile Nicolas-Duranty in Marseilles. Émile Isambert (1828–1876), professor in the Hôpital de Lariboisière, published "Annales de l' oreille et de larynx", and with Becquerel, Dariot and others described diphtheria as a form of gangrene, differing in this from Bretonneau. — A new method for the treatment of diseases of the larynx (and lungs) was introduced by Jean Sales-Girons (1808–1879), by his invention of an apparatus for the pulverization of medicated solutions, described in his "Thérapeutique respiratoire. Traité théorique et pratique des salles de respiration nouvelles (à l' eau minérale pulvérisée) dans les établissements thermaux" etc., 1858, though the same method had been invented in 1854 by Dr. Pserhofer, physicus at Papa in Austria, and laid before the Académie at Paris for examination. S. A. Fauvel and M. Krishaber, to the latter of whom (shortly before his death in 1883), in conjunction with Dieulafoy, the Montyon Prize had been awarded for a treatise upon the inoculation of tuberculosis, and Dr. Blanc (died 1884) in Lyons likewise deserve notice in this place.

The specialty of Ophthalmology, heretofore assigned to surgery, was in like manner elevated into a distinct department by Germans, and first by Julius Sichel (1802–1868) of Frankfort-on-the-Main, a scion of the Vienna school. In 1848 he published his "Leçons cliniques sur les lunettes" etc., and his "Iconographie ophthalmologique" etc., 1852–59, furnished an excellent pathologico-anatomical atlas of the diseases of the eye. Sichel enjoyed an extraordinary experience, and was the first among our ophthalmologists who had a knowledge of history and officiated as an historian. Carron du Villards and Louis Aug. Desmarres (1810–1882), familiar to us through the German translation of his book, belonged in part at least to the pre-ophthalmoscopic period. Desmarres, originally steward of an estate, obtained the means to pursue his studies by giving lessons upon the violin. Graduating in 1839, he became Sichel's assistant and the teacher of Albrecht von Graefe. Alphonse Desmarres, his son, represents, as he says, the "national French ophthalmology", which is mainly operative and eschews the German methods. Even after the invention of the ophthalmoscope, it has been Germans or men of German descent who have cultivated in France this peculiarly German specialty since the time of Bartisch. Next to Sichel we may mention L. von Wecker, a native of Frankfort, a famous operative ophthalmologist and inventor of refractive ophthalmoscopes; Ed. Meyer, a Swiss, professor in Paris and a popular oculist (Traité pratique des maladies des yeux, 1873); Richard Liebreich (born 1830), who settled first in Paris and in 1870 removed to London (Atlas d' ophthalmoscopie, 2d edition 1870, etc.); Edmund Landolt and Photinos Panas (a Greek), the latter of whom has been since 1879 the first special professor of ophthalmology in the University; Marc Ant. L. F. Giraud-Teulon, a native Frenchman; V. F. Szokalski (born in 1811), a Pole, who graduated at Giessen in 1834, then went to Paris and became Sichel's assistant, but was called to his native city Warsaw in 1854 to fill the chair of ophthalmology; Xaver Galezowski (born 1832), an eminent Russian ophthalmologist settled in Paris; Castorani; Francesco Rognetta (1800–1857), an Italian who settled in Paris; Victor Stoeber (1803–1871), professor of ophthalmology in Strassburg during the French period, and many others, most of them, as we see, foreigners.

A specialty especially and eminently cultivated by the French in the present century and recently introduced by them into Germany is that of Hygiene, a term under which, however, the French understand what we call Medical Police. This specialty, both before and since the appearance of the modern French medicine, has had a large number of representatives in all conceivable directions. Besides this there is also a Committee of Public Hygiene for the whole of France. — Among the

French hygienists we should mention Ratier; Reveillé-Parise; Charles Londe (Nouveaux éléments d' hygiène) in the acceptation of Broussais; H. Royer-Collard, professor of hygiene in Paris, one of the most important of French hygienists (Organoplastie hygiènique ou essai d' hygiène comparée etc., 1843); L. R. Villermé (Mémoire sur la mortalité, 1828); Fr. Mélier (De la santé des ouvriers employés dans les manufactures de tabac and Sur les marais salants, 1844); Edouard Seguin (1812–1880), who wrote on the management of idiots and persons of feeble mind; Tanquerel des Planches (Traité des maladies de plomb ou saturnines etc., 1839); J. Sédillot (Revaccination, 1840); François Foy, (Manuel d' hygiène, 1845); J. Ch. M. Boudin (Études d' hygiène publique etc., 1846); Paul Chevallier; Gaultier de Claubry (hospitals). One of the most important French hygienists was Ambroise Auguste Tardieu (1818–1879), the famous medico-legal expert in the cases of Dr. Couty de la Pommerais, Troppmann, Pierre Bonaparte and Victor Noir etc., successor of the famous experimenter and chemist Orfila in the chair of forensic medicine, and president of the committee of public hygiene (Étude médico-légale sur les attentats aux mœurs, 7th edition 1878, etc.); likewise A. J. B. Parent-Duchatelet (1790–1836), member of the Board of Health of Paris (Prostitution etc.); the anti-mercurialist Armand Després (venereal diseases, 1870); J. Jeannel in Bordeaux (De la prostitution dans les grands villes en XIX. siècle, 2d edition, 1873); Maxime Vernois (died 1877), a member of the Académie (Traité pratique d' hygiène industrielle et administrative); M. Vernois and Grassi (ventilation and heating etc.); Fr. Ribes, professor in Montpellier, (Traité d' hygiène therapeutique etc., 1860), equally famous with J. B. Fonssagrives, professor of hygiene in Montpellier (Hygiène et assainissement des villes, 1874; Traité d' hygiène navale, 1856; Hygiène alimentaire etc., 1867) etc.; P. Foissac (La longevité humaine, 1873; Hygiène philosophique, 1863) etc.; Michel Lévy at the Val de Grâce (Traité d' hygiène publique et privée, 5th edition, 1869); A. Magne (Hygiène de la vue, 1866); Ad. Motard (Traité d' hygiène générale, 1868); Aug. Louis Dominique Delpech (1818–1880), who wrote upon the diseases peculiar to artisans; A. Layet (Hygiène et maladies des paysans, 1880); Jean Bapt. Hillairet (died 1882), who wrote on the diseases of laborers engaged in the manufacture of compounds of chromium; Angel Marvaud at the Val de Grâce (Hygiène militaire etc., 1873); Gaffard (tobacco, 1872); Gubler, a member of the Comité d' Hygiène; Paul Jolly (alcohol, 1867, absinthe and tobacco, 1871); Hipp. Jaquemet (Des hôpitaux et des hospices, 1866); Henri Perrusel, professor in Paris (Cours élémentaire d' hygiène, 1873); Élie Chastang (naval hygiene, 1873); André Victor Cornil, professor in Paris (Leçons élémentaires d' hygiène, 1873); Louis Adolphe Bertillon (1821–1883), one of the most eminent statisticians; Vallin, professor, and since 1877 editor of the "Revue d' hygiène et de police sanitaire"; Napias and J. Martin (L' étude et le progrès d' hygiène en France de '78–'82); P. C. H. Brouardel, and many others.

The modern germ-theory, which has attained such development and dominance in Germany, was first suggested in France by the discovery of the yeast plant by Cagniard Latour (1836), and the teachings of Pouchet that the germs of the fungi which occasioned fermentation and putrefaction originated from the air. The existence of these germs was subsequently demonstrated experimentally by Pasteur, and the germ-theory applied to the pathological doctrine of infection or etiology by Nepveu, Felix Rochard, Davaine, Lagneau, Léon Colin at the Val de Grâce and others.

[The modern specialty of Gynæcology, called into existence by the reinvention of the speculum uteri by Récamier in 1801, and its introduction to the medical profession in 1818, has found in France many eminent cultivators. Among these we may mention the well-known midwife of the Maternité, Marie Anne Victoire Boivin

(1773-1847), who, in conjunction with her nephew Antoine Dugés, published in 1833 a "Traité pratique des maladies de l' utérus et de ses annexes"; François Mélier (1798-1866), who proposed the use of intrauterine injections in 1832; Adam Raciborski (1809-1871); the eminent surgeon Jacques Lisfranc (Maladies de l' utérus, edited by Pauly, 1836); Marc Colombat-de-l' Isére (1798-1851; De l' hystérotomie etc., 1828; Traité complet des maladies des femmes etc., 1838); Blatin and Nivet, (Traité des maladies des femmes, 1842); Pierre Charles Huguier (1804-1873); François Amilcar Aran (1817-1861; Leçons cliniques sur les maladies de l' utérus et de ses annexes, 1858); Alfred Becquerel (Leçons cliniques sur les maladies de l' utérus 1859); Bernutz and Goupil (Clinique médicale sur les maladies des femmes, 1860-62); A. H. P. Courty (Traité pratique des maladies de l' utérus, des ovaires et des tromps etc., 1866); Alphonse Alex. Boinet (Traité pratique des maladies des ovaires et de leur traitement etc., 1867); Auguste Nonat (Traité pratique des maladies de l' utérus et de ses annexes, 1869); Eugène Koeberlé, the famous ovariotomist of Strassburg; Jules Péan (ovariotomy, 1867); T. Gallard (Leçons cliniques sur les maladies des femmes, 2d edition 1879), and many others. H.]

The early efforts of the anatomical school in the sphere of the general hygienic management of an entire people, in contradistinction to the treatment of individuals (the latter, in accordance with its whole tendency, this school regarded as tolerably barren in results), exhibit in a somewhat milder light the deficiencies inherent especially in its therapeutics, and show likewise that the French are at bottom always inclined to take hold practically wherever success opens the way. In this most promising department of hygiene French medicine obtained again the precedence of the German school, which has pursued this branch with energy in the last few years only, and particularly in the sphere of the prevention of epidemic diseases, to which the French have paid less attention.

Another proof of the independence of French medicine is found in its earnest devotion to history manifested by the publication of several general histories of medicine, a department in which for nearly a century France had exhibited almost perfect literary quietude. Yet in the Université medical history has always enjoyed a chair of its own, and has not been assigned as an incidental branch to the teacher of some secondary department, as has been the case in Germany, with the exception of Vienna. In this chair the thorough and ingenious Charles Victor Daremberg (died 1872) and Paul Jos. Lorain (1817-1876) displayed their activity. Here too taught Bouchut, while the navy physician Jules Rochard has recently written a good history of French surgery in the 19th century, and Frédault and Bouchut, each a general history of medicine. Until 1879 Marie Jules Parrot occupied the chair of the history of medicine in Paris, exchanging it at that period for the chair of the diseases of children, and finding in Jean J. A. Laboulbène his successor in the department of medical history. Louis Adolph Bertillon (1821—1883), at the time of his death, was the professor of geographical pathology. But the greatest historical investigator among the French during the present century was the academician and senator Maximilien Paul Émile Littré (1801-1881), the translator of Hippocrates (Oeuvres d'Hippocrate, 10 vols., 1839-61), and author of the "Dictionnaire de la langue Française" (4 vols., 1863-72).

g. English Medicine, including the so-called Dublin School of Pathological Anatomy.

England, after her excessive participation in the Iatrochemistry and particularly the Iatromechanics of the seventeenth century, a devotion which extended, as we have seen, far into the eighteenth, seems to have lost all confidence in systems and schools of medicine. For no system and no so-called school has since that period gained any large, permanent and exclusive number of followers. At least Brunonianism did not although the English, as a rule, favor active therapeutics. Thus John Armstrong (1709–1779), C. H. Parry (1755–1822), Marshall Hall (1790–1857) and James Wardrop (1782–1869) were great partisans of bleeding and the use of alcohol in the treatment of febrile diseases still flourishes in England. This attitude of reserve, always characteristic of English medicine, it has carried still further during the present century, although for a time it too followed the anatomico-diagnostic medicine of the French school. Cullen, and still more Gregory, who largely followed Cullen's views, were from an early period very active in the production of this result.

Yet even the sober English have not kept entirely free from attempts and hypotheses designed to secure classification and systematization though we may justly concede to them greater freedom in this respect than to the Germans. Only they have followed unconsciously the requirements of Sydenham based upon the national character of the English, and which demanded that hypotheses should have a practical basis, that is should be derived from actual practice, and should be useful.

Accordingly the nosological arrangement of the long popular textbook entitled "The Study of Medicine" (London, 1822) by

JOHN MASON GOOD (1764–1827),

is one of the most practical, inasmuch as its main divisions are based upon certain regions of the body, without separating them too artificially. Good speaks of 1. Diseases of the organs of the voice and of respiration (Pneumonica); 2. Diseases of the organs of digestion (Cœliaca); 3. Diseases of the nervous system, including mental diseases (Neurotica); 4. Diseases of the sexual organs (Genetica); 5. Diseases of the organs of secretion and excretion (Eccritica); 6. Diseases of the blood and bloodvessels, including inflammation, fever, dyscrasia (Hæmatica). In the last class he subscribes to the humoral doctrine.

The memorable discovery in 1816 of Sir Charles Bell (1774–1842) that the posterior roots of the spinal nerves presided over sensation and the anterior over motion, directed anew the attention of the English (which had been already turned specially to the nervous system by Cullen) to this difficult department, and this tendency was subsequently confirmed by the important discovery of reflex phenomena, communicated to the Royal Society by Marshal Hall in 1833. The discovery of these two fundamental laws of nervous physiology affords new evidence of the physiological genius of the English. Both must be considered as important to our knowledge of nervous activity, as were the teachings of Harvey to that of the circulation and development. The discoveries of Bell and Hall stimulated powerfully the study of the physiology and pathology of the nervous system, so that even the surgeons Alexander Shaw, Joseph Swan, Herbert Mayo, Henry Earle, James Macartney etc. devoted attention to this subject.

The theoretical views of

Benjamin Travers (1783–1858), Serjeant Surgeon to the Queen and the first pupil of Sir Astley Cooper, though derived from his surgical experience, seem to have been influenced by the first of the two great physiological discoveries mentioned above, and to have been suggested chiefly by the doctrines of Broussais.

Travers proceeded from the fact that absolutely trifling local accidents, e. g. a traumatic erysipelas, may call forth important general accidents. This action upon the entire constitution, called by Travers "constitutional irritation", he derived from the nervous system, or rather he considered the latter the route of transmission of the "irritation" to the whole body. By constitutional irritation he understood a process, which, in strong contrast to inflammation, subsides without hyperæmia and without the formation of plastic exudation, but which, on the other hand, may occasion liquid products and result in neoplasms, like cancer and other tumors. He likewise divided constitutional irritation (to which belong fever and convulsions) into: *a.* direct, originating in purely local accidents; and *b.* reflected, in which the local, as well as general phenomena undergo a modification.

These views were followed by Sir Astley Paston Cooper (1768-1841) the most eminent English surgeon of his day, and Sir Benjamin Collins Brodie (1783–1862), while Charles J. B. Williams, specially eminent as a cultivator of physical diagnosis (William's "tracheal tone" etc.), as well as J. Crawford (died 1841) regarded the irritation of Travers merely as the incipient stage of inflammation. This "irritation", or its seat, the English physicians (including Bell himself, whose teachings were chosen as the foundation for this view) sought at once in the spinal cord. Among these investigators were Robert Allan (1778–1826), R. Brown (1828) and John Abercrombie (1780–1844) of Edinburgh, who adopted the pathologico-anatomical tendency in his works "Pathological and practical researches on the diseases of the brain and spinal cord", 1827, and "Pathological and practical researches on the diseases of the stomach, the intestinal canal, the liver" etc., 1828. The same may be said of Richard Bright (1789-1858) of London, an extremely thorough and conscientious investigator, who reformed our renal pathology by his description of the disease which bears his name, and which he described in his "Reports of medical cases" etc., published in 1827. Indeed this work of Bright's in many respects introduced the whole of pathology to a new path, so that its author deserves a place among the first physicians of our day. The term "spinal irritation", subsequently employed in Germany as a welcome, new and universal dogma, seems to have been first employed by Dr. C. Brown of Glasgow in 1826, while T. Pridgin Teale, Sr. (1801–1868) of Leeds (A treatise on neuralgic diseases dependent upon irritation of the spinal marrow and ganglia of the sympathetic nerve, London, 1829), G. Tate (Treatise on hysteria, London 1830), Dr. Isaac Parish of Philadelphia ("Remarks on spinal irritation as connected with nervous diseases" in American Journal of Med. Sciences, 1832), the brothers W. and D. Griffin of Limerick (Observations on the functional affections of the spinal cord etc., London, 1834) and Dr. John Marshall (Practical observations on diseases of the heart, lungs, stomach, liver etc., occasioned by spinal irritation etc., London, 1835) with others, collected cases and elaborated the theory of this disease. This "fashionable theory and fashionable disease" was finally substantially terminated by Aaron Mayer (born 1808) of Mettenheim in Rheinhesse, a practising physician in Mayence, in his eminent treatise "Ueber die Unzulässigkeit der Spinalirritation als besondere Krankheit, nebst Beiträgen zur Semiotik und Therapie des Rückenschmerzes", 1849. Its defenders in Germany were Enz, Kramer, Benedict Stilling (1810–1879), Henle, Loweg, Türck and Canstatt, and even to-day the term "spinal irritation" is still preserved and again applied to designate a special group of symptoms.

The pathologico-anatomical tendency in England manifested itself at first chiefly as a continuation of the labors of the great English masters of pathological anatomy of the 18th century, a John Hunter and a Matthew Baillie (1761–1823), the latter of whom in particular had always preserved the stand-point of practical utility. But at a later period too, when the French anatomico-diagnostic school had won considerable influence, the English physicians, in contrast to the German, preserved great independence and soberness, never neglected entirely their own past and the practical duties of the physician for the cultivation of the modern requirements of professional knowledge, in a word they never forgot that before Corvisart, Bayle and Laënnec, they had their own great physician Sydenham. Doubtless this was to some extent due to the fact that in their political and social institutions they had been brought into less intimate contact with the French spirit and the French Revolution than was the case with other nations. Moreover physiology, since the days of Harvey the national department of the English, continued to hold the balance against pathological anatomy, and at a time when in France, through the influence of Broussais, merely the name of physiology and not the thing itself was in vogue. As the result of her peculiar and antique mode of organization of the teaching and the practising faculties, which we have already sketched, England too has continued until the present time free from the excessive specialism which has crept into France and Germany notwithstanding the existence there of special hospitals, and notwithstanding the fact that the ever sober surgeons of that country have had a more considerable influence upon the course of medicine than anywhere else. Even physical diagnosis, practised there for a long time with great predilection and success in a manner intermediate between that of the French and Germans, and for which the special hospitals for pulmonary diseases etc. supplied abundant material, did not degenerate into one-sidedness and enthusiasm, nor even into casuistical pedantry. English medicine on the whole, like the English in general, followed the everyday practical and sober maxim of Sir Astley Cooper: "Profound erudition is good for a man of means — useful and practical knowledge for the physician and surgeon."

Besides the coryphæi already mentioned, the two surgeons named Thomson are worthy of prominence among the more famous English physicians. John Thomson (1765–1846) of Edinburgh, besides works relating to operative and military surgery, wrote also on inflammation (1813), small-pox (1822) etc. He described, and introduced in 1820 the term "varioloid", and advocated the treatment of syphilis without mercury. Anthony Todd Thomson (1778–1849) in London, on the other hand, wrote on materia medica and therapeutics, as well as "Commentaries on diseases of the skin", 1839. He also, like William Wallace (died 1838) in Dublin, devoted attention to the inoculation of syphilis, and Wallace was the first to introduce into general recognition the employment of iodide of potassium in the treatment of that disease (A treatise on the venereal disease and its varieties, Dublin, 1832). Sir Charles Hastings (1794–1866), the founder of the British Medical Association,[1] distinguished himself as an investigator of the subject of inflammation (A treatise on inflammation of the mucous membrane of the lungs etc., London, 1820). He was succeeded in the presidency of this Association by E. Wilkinson (died 1878), for the English, unlike the Germans, always put considerable men at the head of their medical societies.

More decided followers of the pathologico-anatomical and diagnostic tendency were: John Baron (born 1786), author of "An inquiry illustrating the nature of tuberculated accretions of serous membranes etc." (London, 1819); Sir Charles Scudamore (1779–1849), well known for his study of the nature and treatment of the gout (1816), and author of "Observations on M. Laënnec's method of forming a diagnosis of the diseases of the chest by means of the stethoscope, percussion etc.", 1826; Sir John Forbes (1787–1861), a Scotchman, physician-in-ordinary in London, translator of Laënnec's treatise on auscultation (1821), and founder of the Sydenham Society in 1843; Sir James Clark (1788–1870), first physician-in-ordinary to queen Victoria, and author of "A treatise on pulmonary consumption etc." (1835), "The influence of climate in the prevention and cure of chronic diseases etc." (1829); Robert Spittal (1804–1852) of Edinburgh (A treatise on auscultation in diseases of the chest, 1830); Richard Townsend of Dublin, author of a "Tabular view of the principal signs furnished by auscultation and percussion etc." (1832); W. Henderson, who wrote a similar work; David Cragie (1793–1866) of Edinburgh (Elements of general and pathological anatomy, 1828); James Hope (1801–1841) in London, author of "A treatise on diseases of the heart and great vessels etc.", 1832, and "Principles and illustrations of morbid anatomy etc.", 1834; Edward Turner (1796–1837) in Edinburgh and subsequently in London; John Reid (1808–1849), professor in the University of St. Andrews, well known for his researches upon the influence of section of the glossopharyngeus; Sir Anthony Carlisle (1768–1840) in London, a voluminous writer on many medical and surgical subjects; Peter Mere Latham (1789–1875), extraordinary physician to queen Victoria and author of "Lectures on diseases of the heart" (1845), with other works; Sir Robert Carswell (1793–1857), professor of pathological anatomy in University College, and the famous author of "Pathological anatomy. Illustrations of the elementary forms of disease", London, 1833–38; Kiernan (1833), an important pathological anatomist; John O'Brien (yellow atrophy of the liver); John Elliotson (1788–1868), author of a work "On the recent improvements in the art of distinguishing the various diseases of the heart", London, 1838, "Human physiology", 1840, and other writings; Bryan (the sounds of the heart, 1833); Golding Bird (1815–1854), author of "Urinary deposits, their diagnosis, pathology and therapeutical indications", London, 1845; Henry Ancell (1802–1863) of London (A treatise on tuberculosis etc., 1852); Thomas Davies (Lectures on the diseases of the lungs and heart, 1835); Charles Cowan (1806–1868) of Reading, who translated in 1835 Louis' work on phthisis and published in the following year a "Handbook of physical diagnosis"; Ogier Ward, who interpreted correctly the bruit de diable observed by Laënnec, 1837; John Davies; Theophilus Thompson (died 1860), author of "Clinical lectures on pulmonary consumption, delivered at the Brompton Hospital", 1854; Sir Robert Christison (1797–1882), professor of materia medica in the University of Edinburgh, and the most famous pharmacologist and toxicologist of England, discoverer of the effects of the Calabar bean and author of a "Treatise on poisons" (1829); Robert Willis (1798–1878), librarian of the Royal College of Surgeons in London, translator of the works of Harvey for the Sydenham Society, author of "Illustrations of cutaneous diseases etc.", 1839–41, with other works. Magnificent cyclopædias devoted to the investigations of the new tendency were Forbes's "Cyclopædia of practical medicine" (1833–35) and Robert Bentley Todd's "Cyclopædia of Anatomy and Physiology", London, 1839–59. Todd (1809–1860) was equally famous as a surgeon, physiologist and pathological and microscopical anatomist.

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[1] In 1828 Hastings with a few friends founded the "Midland Medical and Surgical Reporter", the influence of which led to the organization in 1832 of the "Provincial Medical and Surgical Association". The first meeting of this association was held in the Worcester Infirmary in July 1832, under the presidency of Dr. John Johnstone of Birmingham. In 1856 the sphere of this society was enlarged, and it assumed the title of the "British Medical Association". H.

Contemporaneously with the English and Scotch physicians just mentioned, and who cultivated the new pathological views and diagnostic advances, there was formed in Ireland, a country more accessible to French influences and more revolutionary in its tendencies than England, the so-called

DUBLIN SCHOOL,

which resembled in its tendencies the French school of pathological anatomy. Its progenitors were John Cheyne (1777–1836), who wrote on the diseases of children (particularly hydrocephalus acutus, 1808, describing the "Cheyne-Stokes" respiration), C. Percival, Abraham Colles (died 1843), John Kirby who, in conjunction with Robert Adams and Read, founded about 1816 the Peter St. School of Medicine, and Pitcairn, the latter of whom was the first physician in England to point out rheumatism as the source of heart troubles. William Stokes (1804–1878) of Dublin is, however, to be considered the most eminent representative of this school.

Stokes, the son of Whitley Stokes, a professor in the university of his native city, was physician to the Meath Hospital and the Infirmary of the county of Dublin. Here he was active for fifty years, succeeding his father in the professorship at the University in 1845. In 1875 he received the Prussian order "pour le mérite", an extremely rare distinction, if orders are to be regarded as distinctions. He distinguished himself both as an author and as a clinical teacher. In many respects he followed the teachings of Broussais. His great work entitled "A treatise on the diagnosis and treatment of the diseases of the chest", London, 1837, characterized by quietness of description and soberness and care in observation (though not always by correct interpretation, particularly of the physical signs), contains the accounts of many personal and other cases of disease, whose pathological anatomy had been investigated, all contributing to the construction of an excellent system of symptomatology, by which, as well as by its reasonable therapeutics, the book is distinguished. Concerning his own merits Stokes says: "Without desiring to praise myself, I believe it necessary only to refer to the dilatation of the air cells, the first stages of pneumonia and phthisis, to cancer of the lungs, to pericarditis and to the signs of the 'Diseases of Accumulation', to show that I have fully recognized the value of physical diagnosis, and that my labors of many years in this great and open field of investigation have not remained without reward." "Pathological anatomy in this work I have touched upon only so far as it was necessary to the elucidation of diagnosis". The following extract will serve as an example of his method.

THE PHYSICAL SIGNS OF PNEUMONIA.

"The sources from which spring the physical signs of this disease may be enumerated as follows: 1. Evidences of local excitation. 2. Evidences of congestion of the blood. 3. Evidences of a decrease in the quantity of air in the affected lung. 4. Signs of increasing solidification of the lung. 5. Phenomena of the voice. 6. Phenomena referable to the circulatory system. 7. Evidences of simultaneous morbid conditions of the pleura. 8. The diminished volume of the lung. — In the foregoing catalogue the signs of intumescence or displacement of the viscera, which in other diseases have such great value, are not introduced. These signs are wanting in pneumonia, for though the observation of Broussais that the ribs make an imprint upon the inflamed lung is often true, yet no marked increase of volume is met with. That appearance too is not always present . . . . these impressions are rarely more than three lines deep, and though their presence shows a certain swelling of the lung, it is yet very manifest that they can do no harm to the diagnosis by leading us to confound a consolidated lung with a distended pleura. In this respect I can only agree with Laënnec, but his assertion that in pneumonia no swelling at all is present is not confirmed by experience." "The bold, and often repeated use of the lancet I consider in most cases unnecessary. . . The importance of local abstractions of blood in the treatment of pneumonia, and which I consider the chief remedial agent, I cannot sufficiently extol. . . . In the Meath hospital we employ the tartar emetic in accordance with Laënnec's prescription, though from a different point of view. This remedy also does the best service when we hear most plainly the crepitant râles, and before complete consolidation has occurred." The last statement is manifestly a theoretical deduction from the physical signs, an error not often observed in Stokes, who still employs, however, Brown's sthenia and asthenia etc.— Other works by this author are an "Introduction to the use of the stethoscope" etc., Edinburgh, 1825, "A treatise on diseases of the heart and the aorta", London, 1853, "Lectures on the theory and practice of physic" (first published in book form at Philadelphia, 1837), etc.

A colleague and friend of Stokes, who evidently stood largely under French influences, though also familiar with German medical literature, was the other chief of the Dublin School, the talented

ROBERT JAMES GRAVES (1797–1853), professor of the Institutes of Medicine in King's and Queen's College, Dublin.

In conjunction with Stokes he published in 1827 "Clinical reports of the medical cases in the Meath Hospital and County of Dublin Infirmary", institutions rendered famous by the labors of these physicians, and, on his own account, some clinical lectures, "A system of clinical medicine", Dublin, 1843 etc. In physical diagnosis he devoted attention particularly to observations in the department of the circulation, the pulse etc., and in therapeutics was a great friend of calomel in large doses in inflammations. In the treatment of fever he was the first (?) to oppose the "absolute diet" of the earlier physicians, and requested as his sole epitaph the simple words "He fed fevers". A statue of Graves was erected in Dublin in 1878. Other prominent associates of the Dublin School were:

Sir Dominic John Corrigan (1802–1880), physician-in-ordinary to the Queen in Ireland, author of "Lectures on the nature and treatment of fever" (Dublin, 1853), and numerous articles upon diseases of the heart; John Houston (1802–1845) of Dublin; James William Cusack (1787–1861), an eminent surgeon; Ch. Benson; O'Brien Bellingham (1805–1857), author of "Observations on aneurism and its treatment by compression", London, 1847, and a "Treatise on diseases of the heart". Dublin, 1853; Sir Henry Marsh (1790–1860); Blackley; Richard Carmichael (1779–1849) an eminent author on venereal disease and an antimercurialist [who, in conjunction with R. Adams and MacDowell, founded in 1826 the so-called Carmichael School of Medicine and Surgery]; the members of the so-called Dublin Committee (Macartney, MacDonnell, Kennedy etc.), chosen in 1835 for the purpose of investigating the cause of the sounds of the heart. This committee was formed as the result of the teachings of C. J. B. Williams, based upon experiments made by himself in conjunction with Hope, H. Johnston and Malton, and its conclusions were followed in most respects by the so-called London Committee of August 1835. The latter consisted of Williams, R. B. Todd M. D., professor of physiology and general anatomy in the Royal College of London (and with Tweedy, Murchison, Gairdner and others the originator of the alcoholic treatment of febrile diseases), and J. Clendinning M. D., member of the Royal Medical and Surgical Society of London, and physician to the Marylebone Hospital. These committees also afford evidence of the scientific accuracy and conscientiousness of English medicine, as well as of its genuine physiological tendency at a relatively early period.

After the forties the prominent influence of the French views, and the original enthusiasm existing as well in Dublin as elsewhere with regard to them, abated more and more. The medicine of Great Britain, having assimilated the new science, resumed once more its wonted practical and national course. It preserved, however, and cultivated in its own way whatever was good and useful — a way hostile to every eccentricity and to all schools, though from the peculiar character of English institutions of learning we might expect the reverse. The individual teacher in England, however, maintains no exclusive following, for outside of his official position he stands on a complete equality with all other physicians, and practitioners (not simple teachers almost exclusively, as in France and Germany) are, likewise, the chief writers upon their practical science. But on this very account English medicine has attained merely a "certain" exactness (Wunderlich).

Many notable English physicians might be mentioned, but we must be satisfied with noticing the following: Sir Henry Halford (properly Vaughan, 1766–1844), ordinary physician of George III., George IV., William IV. and queen Victoria; S. Scott Alison (1813–1877), inventor of a "differential stethoscope" and a sphygmoscope, and author of "Observations on organic diseases of the heart" (1845); Walter H. Walshe (Physical diagnosis of diseases of the lungs, 1843; Practical treatise on diseases of the heart, 4th edition 1873, etc.); Francis Sibson (died 1876), inventor of a "thoracometer" and author of a treatise "On the position of the internal organs in health and disease" (1844), with numerous other journalistic articles; John Hutchinson (1811–1861) inventor of the spirometer, and author of "The spirometer, the stethoscope and scale balance . . . their value in life insurance offices" etc. (London, 1852); Sharpe (physical diagnosis); Richard Quain (stethometer). The seven physicians already mentioned enriched physical diagnosis and invented new methods in this art. The following practical writers distinguished themselves in important subjects in pathology; George Budd (1807–1882), whose treatises "On diseases of the liver" (1845) and "On the organic diseases and functional disorders of the stomach" (1855) are so well known; Charles R. Pemberton (A practical treatise on various disorders of the abdominal viscera, London, 1806); William Pulteney Alison (1790–1859), professor in Edinburgh (Outlines of physiology and pathology, 1833); Charles Turner Thackrah (died 1833), author of "An inquiry into the nature and properties of the blood" etc., London, 1819; Benj. Guy Babington (1794–1866), William Stevens (1786–1868), George Owen Rees (1836), Maitland (1838), all of whom wrote on the blood and its diseases; Ritchie, Lonsdale (1847), Curran (scrofula); Samuel Ashwell (A practical treatise on parturition etc., 1828); Laycock (Nervous diseases of women); Sir Henry Holland (1788–1873), extraordinary physician of William IV. and ordinary physician of queen Victoria, whose "Medical notes and reflections" (1839) are so well known to the profession; Edward Copeman (1809–1880) of Norwich (apoplexy, 1848); James Copland (1791–1870) of London (On the causes, nature and treatment of palsy and apoplexy, 1850; A dictionary of practical medicine, 1832–1858); S. Lane (diseases of the liver and uterus); Sir William Jenner, ordinary physician of the Queen and Prince of Wales (On the identity or non-identity of typhoid, the specific cause of typhus, and relapsing fevers, 1850); Robertson (Contributions to the history and treatment of sexual diseases, 1845); Joseph Henry Bennet (Diseases of the uterus. 1849); John Hughes Bennett (1812–1875), professor of medicine in Edinburgh, who introduced the study of histology and clinical instruction in accordance with the German system, and was the first physician of England to recommend cod-liver oil in tuberculosis (1841); "Clinical lectures on the principles and practice of medicine", 1852; "Pathology and treatment of pulmonary tuberculosis", 1853. Bennet also claimed to have been the discoverer of leucocythæmia (before Virchow), on which subject he published an article in 1850. Alfred Swayne Taylor (1806–1880) who inaugurated forensic medicine in England (Elements of medical jurisprudence, 1836); Markham (Diseases of the heart, 1856); Archibald Billing (1791–1881; First principles of medicine; Diseases of the heart and lungs, 1852); J. W. F. Blundell (Medicina mechanica etc., 1852); W. F. Chambers (1786–1855); J. Banks of Dublin; William Tennant Gairdner of Glasgow; Mac Gregor; Joseph Hodgson (1788–1869) of Birmingham (Essay on diseases of the arteries and veins, 1811); Thomas Hodgkin (1797–1866) of London, discoverer of "Hodgkin's disease" in 1832; Thomas Addison (1793–1860) of Guy's Hospital (On the constitutional and local effects of disease of the supra-renal capsules, 1855); William Prout (1785–1850) of London (Diseases of the kidneys, 1843; proved that the acid in the stomach was hydrochloric acid in 1824); Redfern; James Wardrop (1782–1869); Dr. H. Mac Cormac (On the nature, treatment and prevention of consumption etc.); Greenhill, also a savant; Thomas Bevill Peacock (1812–1882), who wrote on the heart and its diseases, 1865; Norman Chevers (valvular diseases, 1851); Andrew Buchanan in Glasgow; John Bostock (1773–1846) of London (hay fever); Edward Ballard of London (Physical diagnosis of diseases of the abdomen, 1852); the famous Thomas Young (1773–1829), physician, physicist, physiologist and philosopher as well, who gave the first description of astigmatism; Henry Marshall Hughes (1805–1858), author of "Clinical introduction to the practice of auscultation, and other modes of physical diagnosis", 1845; Sir James Paget (born 1814), Sergeant-Surgeon to the Queen, author of "Lectures on surgical pathology" etc., 1863; H. Jones and Sir Edward Henry Sieveking, authors of the famous "Manual of pathological anatomy", 1854; Samuel Wilkes (Lectures on pathological anatomy, 1859); William George Balfour (Diseases of the heart and aorta, 1876); William Henry Broadbent, physician to St. Mary's Hospital in London; Sidney Ringer, (Manual of therapeutics); Charles Murchison (1830–1879), physician to St. Thomas's Hospital in London, a famous epidemiologist; William Benj. Carpenter (1812–1885) in London, well-known as a physiologist and nervous pathologist; the late Nestor of English physicians, Sir Thomas Watson (1792–1882), whose "Principles and practice of physic" (1843), remarkable for both its elegance of style and the soundness of its teachings, continued a most popular text-book in England and the United States for nearly 30 years; and numerous others.

In microscopic anatomy the quiet and persevering English accomplished more than the French, and in this department, as in a portion of physiology, they can point to some important names. We mention:

Sir Everard Home (1763–1832; On the cells of the lungs, 1827, etc.); F. Kiernan (The anatomy and physiology of the liver, 1833); Sir David Brewster (1781–1868: On the microscope, 1837; stereoscope, kaleidoscope); R. B. Todd and W. Bowman (Physiological anatomy and physiology of men, 1845–57); Richard Quain and William Sharpey (1802–1880), the latter professor of physiology and anatomy in University College, a pupil and friend of Rudolphi, and an eminent teacher often styled the "English Joh. Muller" (Elements of anatomy, 1843–46); Sharpey's successor, H. Charlton Bastian (The brain as an organ of the mind etc., 1882); Arthur Hill Hassall (born 1817; Microscopic anatomy of the human body in health and disease, 1846); John Goodsir (1814–1867), professor of anatomy in Edinburgh, and Henry D. S. Goodsir (Anatomical and pathological observations, 1845); G. Rainey (On the finer structure of the lungs and the formation of pulmonary tubercle); Robert Lee (1793–1877), author of "Memoirs on the ganglia and nerves of the uterus", 1849; Sir W. J. Erasmus Wilson (On the structure of the skin, 1849); Thomas Wharton Jones (born 1808; The organ of hearing, 1838); George Harley (born 1829; Anatomy and physiology of the supra-renal bodies, 1861; Histological demonstrations, 1866); [John Quekett (1815–1861; Lectures on histology, 1850–52); Lionel Smith Beal (born 1828), professor of the principles and practice of medicine in King's College (On the structure of simple tissues of the human body, 1861; The microscope in its application to practical medicine), and many others.]

Ophthalmology in England too has always been chiefly in the hands of surgeons.

Among the students of the physiology of the eye we should name here, among others, the famous physicist, originally an apothecary, Sir David Brewster (1781–1868), at whose suggestion, and after the model of the German "Naturforscherversammlung", the "British Association for the Advancement of Science" was organized in the year 1831; also William Hyde Wollaston Sr. (1766–1828; camera lucida, "Wollaston doublet" etc.). Among the distinguished operative oculists of England were and are: Frederick Tyrrell (1797–1843); James Wardrop (1782–1869); William Mackenzie (1791–1868) in Glasgow, the first to describe sympathetic troubles of the eyes; Arthur Jacob (1790–1874), an eminent anatomist and ophthalmologist of Dublin (membrana Jacobi); Charles Gardiner Guthrie (1817–1859); Sir William R. W. Wilde (1815–1876) of Dublin, likewise an aurist; John Vetch (1783–1835), physician to the General Ophthalmological Hospital in London from the year 1817 onward, who described Egyptian ophthalmia, to which the Danish physician Bendz subsequently gave the name trachoma; John Henry Wishart (born 1791), professor of ophthalmology in Edinburgh; Benjamin Gibson (1774–1812) of Manchester, who recommended linear extraction of cataract in 1807, and demonstrated the infectious character of the vaginal secretions in the production of ophthalmia neonatorum; Sir William Bowman; Wood; George Critchett (1817–1882; iridodesis, 1859); J. Soelberg Wells (1824–1879), professor of ophthalmology in King's College, a pupil of von Graefe, and the introducer into England of the ophthalmological advances of Graefe, Donders and Arlt; Thomas Barrows; H. Wilson; John Hughlings Jackson, an eminent ophthalmologist and neurologist, physician to the London Hospital; Sir William Lawrence (1783–1867), an eminent surgeon of St. Bartholomew's Hospital and Serjeant Surgeon to the Queen; Henry E. Juler, assistant surgeon to the Royal Westminster Ophthalmic Hospital; Carter R. Brudenell, ophthalmic surgeon to St. George's Hospital; and others.

The new era of this specialty — one which, as we have seen, has been practised since the earliest periods of history — which was introduced by Helmholtz and von Graefe, has found a memorable international representative in Richard Liebreich, who settled in Paris but removed to London in 1870, where he was appointed ophthalmic surgeon to St. Thomas's Hospital. Recently he has resigned this position and has been succeeded by Edward Nettleship, though Liebreich still retains the position of consulting ophthalmic surgeon.

In addition to Archibald Cleland (1741) and Jonathan Wathen (1755), both of whom practised injection of the Eustachian tube by means of a catheter introduced through the nose, the science of Otology is represented in England by:

John C. Saunders (The anatomy and diseases of the ear, 1806); Sir John H. Curtis, aurist to king George III., and founder in 1816 of the first aural hospital in London; Thomas Buchanan of Hull, an eminent oculist and aurist (1823); Joseph Williams of London (On the anatomy, physiology and pathology of the ear (1839); the famous ophthalmologist Thos. Wharton Jones (1838); William Dufton of Birmingham (The nature and treatment of deafness and diseases of the ear, 1844); Hugh

Neill of Liverpool, where he established an Ear Infirmary in 1839; George Pilcher of London (1838); Adam Warden of Edinburgh, inventor of an "auriscope" described in 1844; James Yearsley of London, who described the use of an artificial membrana tympani in 1848; Sir William R. W. Wilde, an eminent physician and savant of Dublin (Practical observations on aural surgery etc., London, 1853); the famous Joseph Toynbee (1815–1866) of London, also inventor of an artificial drum-membrane, who fell a victim to his own zeal in experimentation (Diseases of the ear etc., London, 1860); Peter Allen (1826–1874), aural surgeon to St. Mary's Hospital in London (Lectures on aural catarrh, 1871); James Hinton, the assistant and friend of Toynbee (Atlas of the membrana tympani etc., London, 1874); Llewellyn M. Thomas of London, surgeon to the Central London Throat and Ear Hospital; H. Macnaughton Jones (Atlas of diseases of the membrana tympani and auricle, London, 1878); Peter Mac Bride of Edinburgh; Urban Pritchard, professor of otology in King's College Hospital, and the first professor (1866) of this specialty in England; Edward Woakes, aural surgeon to the London Hospital; W. B. Dalby, aural surgeon to St. George's Hospital etc.

The department of Electro-therapeutics, in which the sober English display much less enthusiasm than the French and Germans, can point as its representatives to:

John Birch, surgeon of St. Thomas's Hospital, who wrote as early as 1779 a treatise entitled "Considerations of the efficacy of electricity in removing female obstructions" etc. He was followed by Joseph C. Carpue (1764–1846) of London, best known probably for his rhinoplastic operations according to the Indian method, performed as early as 1814, but the author also of "An introduction to electricity and galvanism" etc., published in 1803; Alfred Smee (1818–1878), surgeon to the Central London Ophthalmic Hospital and inventor (1840) of the so-called "Smee's battery"; and the coryphæi of the most recent system; A. Hughes Bennett (Electricity as a method of physical diagnosis in diseases of the nervous system, London, 1880); Herbert Tibbits of London, physician to the West End Hospital for Nervous Diseases, and with Dr. Stretch Dowse the founder of the first school of electricity and massage in England; Armand de Watteville of London, editor of the journal "Brain", and Julius Althaus, Senior Physician to the Hospital for Epilepsy and Paralysis. The latter two physicians are, however, foreigners, the former a Swiss and the latter a German.

The specialty of Diseases of the Throat, Larynx etc. is represented by

Benj. Guy Babington (1794–1866), an extremely erudite and versatile physician of Guy's Hospital, who in 1829 invented an imperfect laryngoscope; John Bishop (1797–1873), who wrote upon the physiology of the voice (1836) and laryngoscopy (1862); Sir Edward H. Sieveking (The laryngoscope, 1862); Thos. James Walker, surgeon to the Peterborough Infirmary and Dispensary (The laryngoscope and its clinical applications, 1863); Philip Crafton Smyly of Dublin (Course of lectures on the use of the laryngoscope, 1864); Sir Geo. Duncan Gibb (1821–1876) of London (Diseases of the throat, epiglottis and windpipe, 1860); George Johnson, Professor of Clinical Medicine in King's College Hospital (The laryngoscope etc., 1864); Ebenezer Watson (died 1886); and more recently by Lennox Browne (The throat and its diseases, London, 1878); Geo. Vivian Poore; W. Gordon Holmes of London (Guide to the use of the laryngoscope in general practice, 1881); M. Prosser James, Physician to the Hospital for Diseases of the Throat (Lessons in laryngoscopy and rhinoscopy, 1878); Felix Semon, a German physician of London, who translated the work of James, and finally Morell Mackenzie, founder in 1863 of the Hospital for Diseases of the Throat in London (Diseases of the throat and nose, 1880–1884), who, in order to open the way to ambition, undertook the unenviable rôle (declined by all the German physicians) of denying the cancerous nature of the disease of the late emperor Frederick, and even cynically and openly admitted the fact, when, with a fee of 250.000 marks in his pocket, he had turned his back upon Germany.

The Diseases of Children, always a favorite branch with English physicians, can point with pride to a long line of eminent and successful students and writers, among whom we may enumerate:

William Nisbet (1759–1822) of Edinburgh, author of "The clinical guide; or a concise view . . . of the diseases of infancy and childhood, London, 1800; the famous John Cheyne (1777–1836) of Edinburgh and Dublin (Essays on the diseases of children, 1801); John Clarke Jr. (1815) of London; James Kennedy of Glasgow (1825); John North (1790–1873), professor of midwifery in the Middlesex Hospital (Practical observations on the convulsions of infants, 1826); Henry Maunsell, (1806–1879) and Richard T. Evanson of Dublin (A practical treatise on the management and diseases of children, 1836); Charles Johnson (1794–1866) of Dublin, who, with Sir Henry Marsh, founded the Children's Hospital in Pitt St., and in conjunction with David H. Mac Adams published "A treatise on the diseases of children", London, 1836; Charles West of London (Lectures on the diseases of infancy and childhood, 1848); the eminent Dublin obstetrician, Fleetwood Churchill (1808–1878), whose treatise on "The diseases of children", Dublin 1850, long maintained a deserved popularity; Pye Henry Chavasse (1810–1879) of Birmingham; William H. Day of London; Edward Ellis, Physician to the Samaritan and Victoria Children's Hospital (Practical manual of the diseases of children, London, 1881); Edmund Owen of London (The surgical diseases of children, 1885); Thomas Hawkes Tanner (1824–1871; A practical treatise on the diseases of infancy and childhood) etc.

The department of Diseases of the Skin finds numerous representatives, among whom we may mention:

Robert Willan (1757–1812), whose well-known "Description and treatment of cutaneous diseases" appeared at London 1698–1807; Thomas Bateman (1778–1821), author of "A practical synopsis of cutaneous diseases" etc., London, 1813; Walter C. Dendy of London, Surgeon to the Children's Hospital (Treatise on the cutaneous diseases incident to childhood, 1827); Samuel Plumbe (A practical treatise on the diseases of the skin, 1837); Jonathan Green (Practical compendium of the diseases of the skin, with cases, London, 1835); Anthony Todd Thomson (1778–1849), author of "Communications on diseases of the skin, London, 1839); John Moore Neligan (1815–1863) of Dublin, whose "Practical treatise on the diseases of the skin" appeared in 1852; Sir W. J. Erasmus Wilson (1809–1884), professor in the College of Surgeons until 1878, founder of the chair of dermatology in this College and of the Museum of Dermatology, founder also of the chair of pathology in the University of Aberdeen, a famous Egyptologist, who removed Cleopatra's Needle to England at his own expense (Diseases of the skin, 1842, with numerous other contributions to dermatology); William Frazer of Dublin (Treatment of diseases of the skin" 1864); John L. Milton of London (The modern treatment of diseases of the skin); Tilbury Fox (1836–1879), author of "A treatise on skin diseases", 1864; Thomas Hillier (Handbook of Skin Diseases, 1866); McCall Anderson of Glasgow (Contributions to dermatology, 1866); Henry Radcliffe Crocker, the successor of Tilbury Fox in University College, London; Robert Liveing, lecturer on dermatology in the Middlesex Hospital; Malcolm Morris, Lecturer on Dermatology in St. Mary's Hospital Medical School (Skin diseases); Austin Meldon of Dublin (A treatise on diseases of the skin and its appendages, 1873); C. Hilton Fagge (1838–1883) of Guy's Hospital, the translator of Hebra's treatise; Alfred Sangster of Charing Cross Hospital: James Startin; A. J. Balmanno Squire, Surgeon to the British Hospital for Diseases of the Skin, etc., etc.

In the department of Alienistic Medicine Henry Maudsley (born in 1835; The physiology and pathology of the mind, 1867), professor of forensic medicine in the London University, is specially well-known in Germany.

[Other important writers upon this branch are: Thomas Arnold (Observations on the nature, kinds, causes and prevention of insanity, 1782–86); John Haslam (1764–1844), author of "Observations on insanity" etc., London, 1798, with numerous other treatises; Sir Alexander Crichton (1763–1856) of London (An inquiry into the nature and origin of mental derangement, 1798); Bryan Crowther (1765–1840), surgeon to the Bridewell and Bethlehem Hospital (Practical remarks on insanity, 1807); Geo. M. Burrows (1771–1846), the proprietor of a private asylum at Clapham (Commentaries on the causes, forms, symptoms and treatment, moral and medical, of insanity, 1828); Sir William Chas. Ellis (On the nature, causes and treatment of insanity. London, 1838); Thomas Mayo (1790–1871), author of "Medical testimony and evidence in cases of lunacy", 1854; John Conolly (1796–1866), physician to an insane asylum at Hanwell near London, and the first alienist in England to popularize the "No restraint system". In 1856 he reported that in 24 English asylums, containing more than 10,000 patients, mechanical restraint was substantially done away with. James Cowles Pritchard (1785–1848), an eminent anthropologist (A treatise on insanity etc. 1835); John Pagan (1802–1868), author of "The medical jurisprudence of insanity", (1840); Forbes Winslow (On obscure diseases of the brain and disorders of the mind, London, 1860); John Charles Bucknill (Prize essay on criminal lunacy) and Daniel Hack Tuke (son of Samuel Tuke, founder of the York Retreat for the Insane in 1792), who published in conjunction "A manual of psychological medicine" in 1858. The latter alienist also published in 1882 "Chapters in the history of the insane in the British Isles". Robert Boyd (1808–1883), who perished in the burning of his own private asylum at Southall Park in Middlesex (General paralyses of the insane 1871); David Skae (1814–1873), physician to the Morningside Asylum near Edinburgh (On the legal relations of insanity, 1861); William L. Lindsey of Perth (Theory and practice of non restraint etc., 1878); G. Fielding Blandford (On insanity and its treatment); Thomas S. Clouston, Lecturer on Mental Diseases in the University of Edinburgh (Clinical Lectures on Mental Diseases) etc.]

Although various themes in the department of Hygiene were discussed by individual physicians in the first third of the present century, e. g. Sir Lucas Pepys (1742–1830), President of the Army Medical Board, Sir John Sinclair (1754–1835), the eminent Scotch statistician, Charles Maclean (epidemic diseases, quarantine etc., 1815), Charles Turner Thackrah (died 1833) of Leeds (The effects of the principal arts, trades etc. . . . . . on health and longevity, London, 1831), Henry Belinaye (1832), a surgeon of London, Francis Bisset Hawkins (Elements of medical police etc., London, 1834), it was not until the advent of the cholera in 1831 and the earnest labors of Sir Edwin Chadwick (born 1799), Dr. William Farr (1807–1883), Dr. Thos. Southwood Smith (1788–1861), Dr. William Augustus Guy (1810–1885) and others, that public attention was specially directed to this branch of medicine. The report of the Health of Towns' Commission in 1844 startled the public from its indifference and led directly to the adoption by Parliament of the Public Health Act of 1848. By this Act a General Board of Health was constituted, with a staff of inspectors authorized to inquire into the sanitary condition of all towns whose returns to the Registrar-General showed an excessive mortality. The Public Health Act of 1848 was followed by the Common Lodging Houses' Act (1851), the Labouring Classes Lodging-Houses' Act (1852), the Metropolis Management Act of 1855 and various others. In 1858 the powers of the General Board of Health were transferred to the Privy Council, and the Local Government Board Act was passed. The appointment of Mr. John Simon (1816–1883) as Medical Officer of the Privy Council, with a staff of medical inspectors, opened a new era in the sanitary science of England. The Local Government Board Act of 1871, the Public Health Acts of 1872 and 1875 and various other Acts have contributed to the perfection of the system of public hygiene.

Among the individual representatives of this branch, without laying claim to any more completeness than in the preceding departments, we may mention:

The distinguished pioneers James Johnson (1777–1845); Sir Robert Christison (1797–1882) of Edinburgh; E. Symes Thompson; H. Mac Cormac; Edward Latham; H. Greenway; Lionel S. Beale; John Eric Erichsen (Hospitalism, 1874); R. Angus (1817–1884) and Edward Smith; William Howship Dickinson; F. Chauncey Perkins; Charles Hilton Fagge (1838–1883), professor of hygiene in Guy's Hospital, and Dr. Cameron, who occupies the same position in Glasgow. The famous Edmund A. Parkes (1819–1876) accepted in 1860 the chair of hygiene in the Army Medical School at Netley (the first chair of hygiene founded in England), and established the Parkes' Museum of Hygiene. His "Manual of practical hygiene etc." (1864) is one of the best known treatises in this department of medicine. "Nothing is so dear as sickness, and nothing so profitable as expenditures which increase health, and thus the power to work" runs his genuine English maxim. To these we may add Dr. Geo. Buchanan (On the relation of phthisis to soil moisture); Dr. George Wilson (A handbook of hygiene and sanitary science, 1872); Edward Cator Seaton (1815–1880), to whose exertions England owes the Compulsory Vaccination Act of 1853 (Handbook of vaccination, 1868); Joseph Snow (1813–1858; Report on cholera, 1849); Edward H. Greenhow; Edward Ballard; John Netten Radcliffe (1830–1884); Sir Charles Alex. Cameron, Chief of the Public Health Department of Dublin (Manual of hygiene etc.); Richard Thorne; Ed. A. Mapother of Dublin; H. Letheby, Medical Officer of Health for London etc.

As representatives of the Pathologia animata or Germ Theory of disease we may mention John Burdon Sanderson, professor of physiology in Oxford, who regards contagia as organized beings, which produce disease by their development; Lionel S. Beale, who considers the contagia to be living particles of an organism (bioplasts), which plant themselves upon another organism and multiply within the latter; Sir Joseph Lister (The germ theory of fermentation and its bearings on pathology 1878), founder of the well-known system of "Listerism"; and Alexander Ogston, Regius Professor of Surgery in the University of Aberdeen (Report upon micro-organisms in surgical diseases, 1881). Among the opponents of this theory are Henry Charlton Bastian, professor of pathological anatomy in University College (The modes of origin of the lowest organisms, 1871; The beginnings of life, 1872); Benjamin Ward Richardson of London (Hygiea: a city of health, 1875); Joseph Snow (1813–1858) of London, and others.

The department of Diseases of the Nervous System was cultivated in the first half of the century by:

Samuel Fothergill (tic douloureux, 1804), the eminent John Abercrombie (1781–1844) of Edinburgh, John Cheyne of Dublin (acute hydrocephalus, 1808), James Parkinson (Essay on the shaking palsy, 1817), Herbert Mayo (died 1852), David Urwins (1780–1837) of London, the brothers William and Daniel Griffin of Limerick (spinal irritation, 1834), and numerous others, while the latter half of the century can point to the eminent neurologists: Thomas Buzzard, J. Spence Ramskill, Chas. Bland Radcliffe, J. Hughlings Jackson, H. Charlton Bastian, William Henry Broadbent, Francis Edmund Anstie James Warburton Begbie (1826–1876), J. Russell Reynolds, Julius Althaus, and a host of others.

Finally the specialty of Venereal Disease has been well cultivated by Langston Parker (1805–1871) of Birmingham, author of "A manual of the modern treatment of syphilitic disease", London, 1839; William Acton (1813–1875), a pupil of Ricord (A complete practical treatise on venereal diseases etc., 1841); Richard Carmichael (1779–1849) of Dublin (An essay on the venereal diseases which have been confounded with syphilis etc., Dublin, 1814); William Wallace of Dublin (died 1838), the first in 1836 to introduce the use of iodide of potassium in syphilis into general recognition by the profession; Henry Lee, Consulting Surgeon to St. George's Hospital (Calomel fumigation in the treatment of syphilis, 1856); John Laws Milton; Frederic Carpenter Skey (1798–1872), author of "A practical treatise on the venereal disease", London, 1841; Jonathan Hutchinson (Clinical memoir on certain diseases of the eye and ear consequent on inherited syphilis, 1862, etc.); Berkeley Hill, Surgeon to the Lock Hospital (Syphilis and local contagious disorders, 1868); Sir Henry Thompson (The pathology and treatment of stricture of the urethra, 1852); with many others.

It is a striking peculiarity of English medicine, by which it is distinguished from the French, as well as the Italian, Spanish and German, that while it cultivates the historical in particulars and in its own career, it has lacked, since the time of Freind, any writer of its own upon the subject of *general* medical history. This want manifestly originates from the avoidance of the appearance of pedantry, so characteristic of English physicians, and still more from their constant inclination to the pecuniary and practical advantages of their profession — a profession which they regard half in the light of an ordinary business. Hence the history of medicine seems a purely literary undertaking, unsuited to the practical programme laid out for physicians and surgeons by Sir Astley Cooper — a programme, by the way, which seems to us Germans rather narrow-minded in its conception.

[Among the more important general physicians of the United States during the first half of the present century were: Caspar Wistar (1761–1818) of Philadelphia, author of "A system of anatomy" (1812) highly prized as a text-book in its day; David Hosack (1769–1835) of New York, a partner of Dr. Samuel Bard and professor of Theory and Practice in the College of Physicians and Surgeons (1813). He published a "System of Nosology", which reached two editions, and his "Lectures on Theory and Practice" were edited by Dr. Ducachet and published at Philadelphia in 1838; John Redman Coxe (1773–1864) of Philadelphia, a student of Benj. Rush, who completed his medical education in Edinburgh, London and Paris. He occupied the chair of Materia Medica and Pharmacy in the University of Pennsylvania, 1818–1835, and published "The American Dispensatory" (1806), "The Philadelphia Medical Dictionary" (1808) and "The Writings of Hippocrates and Galen" (1846); Nathaniel Chapman (1780–1853), a pupil of Rush and Abernethy, professor of the Theory and Practice of Medicine in the University of Pennsylvania, 1816–1850, and author of a treatise on "Therapeutics and Materia Medica" (1817), the first of its kind in the United States, and the best at that period in the English language; Dr. John Eberle (1788–1838), professor of Theory and Practice in the Jefferson School of Philadelphia, 1825–1831, and author of a popular "Practice of Medicine" (1829); Samuel Jackson (1787–1872), professor of the Institutes of Medicine in the University of Pennsylvania, 1825–1863, who published in 1832 his "Principles of Medicine", in which he follows the pathological doctrines of Broussais; James Jackson (1777–1867) of Boston, a graduate of Harvard and European schools, first physician to the Massachusetts General Hospital in 1810, and professor of Theory and Practice in the Massachusetts Medical School (1812). He published in 1816 a Syllabus of his lectures on practice, but his best known work is his "Letters to a young physician" (1855); William Tully (1785–1859), professor of Materia Medica and Therapeutics in Yale College, 1829–1841, and author of an elaborate and profound treatise on "Materia Medica, or Pharmacology and Therapeutics", Springfield, 1857–58; John W. Francis (1789–1861) of New York, a partner of Dr. Hosack, professor of Obstetrics in the College of Physicians and Surgeons and in Rutgers Medical College, 1826–30; Joseph Mather Smith (1789–1866) of New York, professor of Materia Medica in the College of Physicians and Surgeons, 1855–66; John K. Mitchell (1793–1858) of Virginia, professor of Practice in Jefferson Medical College, Philadelphia, 1841–1858, and author of a dissertation "On the cryptogamous origin of malarious and epidemic fevers" (1849), distinguished for its ingenuity and completeness; Franklin Bache (1792–1864) of Philadelphia, another pupil of Rush, professor of Chemistry in Jefferson Medical College, and well-known as one of the authors of "The Dispensatory of the United States of America", first published in conjunction with Dr. Geo. B. Wood in 1833; Samuel Henry Dickson (1798–1872) of Charleston, S. C., professor in the Charleston Medical School, 1824–31, 1833–34 and 1850–57, and an eminent journalistic writer and lecturer; Robley Dunglison (1798–1869), a native of England, educated in London, Edinburgh and Paris. In 1824 he was invited by Thomas Jefferson to occupy the chair of Anatomy, Physiology, Materia Medica and Pharmacy in the University of Virginia, in which institution he continued to teach until 1833. In the latter year he accepted several chairs in the University of Maryland, but in 1836 removed again to Philadelphia, where he occupied the professorship of the Institutes of Medicine in the Jefferson Medical College, 1836–1868. His industry as a writer was enormous, and extended to almost all branches of medicine. His Physiology (1832), Medical Dictionary (Boston, 1833), Hygiene (1835), Therapeutics (1836), Practice (1842) and Materia Medica (1843) were all popular text-books in their day, and the last edition (1874) of his Medical Dictionary, edited by his son, Richard J. Dunglison, is the most complete work of its kind in existence. Even a course of lectures upon the history of medicine delivered at the University of Virginia by Dr. Dunglison, has been published by his son under the title "History of Medicine from the Earliest Ages to the Commencement of the Nineteenth Century" (Philadelphia, 1872); René la Roche (born 1795) of Philadelphia, whose treatise on "Yellow Fever" (1855) is well known to all physicians; George B. Wood (1797–1879) of Philadelphia, author of "A treatise on the practice of medicine" (1847), "Therapeutics and Pharmacology" (1856), and co-editor of the U. S. Dispensatory; Daniel Drake (1785–1852), founder of the Medical College of Ohio at Cincinnati in 1819, and author of the well known and very valuable "Systematic treatise on the principal diseases of the interior valley of North America etc.", 1850–1854; the versatile Nathan Smith (1762–1829), whose professional energy, unsatisfied by representing in himself for twelve years (1798–1810) the entire Faculty of the Medical Department of Dartmouth College, led him to lecture on medicine also in the University of Vermont and Bowdoin College, and to accept likewise a professorship in the new medical school of Yale College in 1813. His "Essay on Typhus Fever", published in 1824, recognizes the self-limited character of that disease (now called typhoid), and its dependence upon a specific cause. Joseph Parrish (1779–1840), surgeon to the Pennsylvania Hospital, 1816–1820; Jacob Bigelow (1787–1879) of Boston, whose "American Medical Botany" (1817–1821) has been already mentioned, and who recognized in his "Discourse on Self-limited Diseases" (1835) the general law of self-limitation now known to exist in many morbid processes; William Beaumont (1785–1853), an army surgeon, whose researches in connection with the case of Alexis St. Martin threw much light upon the subject of stomach digestion (The physiology of digestion, with experiments on gastric juice, by William Beaumont, M. D., U. S. A. Plattsburgh, 1833); William E. Horner (1793–1853) of Philadelphia, professor of anatomy in the University of Pennsylvania, author of various treatises on anatomy, histology and pathology, and the first physician to demonstrate the true character of the "rice-water" discharges in cholera; the accomplished brothers Beck, viz. Theodoric Romeyn (1791–1855), professor of Materia Medica in the Albany Medical College, 1840–1854, and author of a valuable and extremely popular treatise on Medical Jurisprudence (1823); John B. Beck (1794–1851), professor of Materia Medica in the College of Physicians and Surgeons (1826), and author of "Essays on Infant Therapeutics" (1849), "Historical Sketch of the State of Medicine in the American Colonies" (1842), "Lectures on Materia Medica" (edited by C. R. Gilman, 1851); Lewis C. Beck (1798–1853), professor of chemistry and pharmacy in the Albany Medical College (1840), and author of a Report on Cholera, made to the Governor of New York in 1832; Caspar Wistar Pennock (1800–1867) of Philadelphia, (Report of experiments on the action of the heart, 1839); John Ware (1795–1864) of Boston, professor of Theory and Practice in Harvard College, 1832–58, author of "Contributions to the History and Diagnosis of Croup", 1842, etc.; Elisha Bartlett (1804–1855), professor in the University of the City of New York, 1850, and a fertile author, whose work on "The history, diagnosis and treatment of the fevers of the United States" (1847) is a standard authority in its department; W. W. Gerhard (1809–1872) of Philadelphia, author of a "Treatise on the diagnosis of diseases of the chest" (1836), and among the first physicians to emphasize the essential distinction between typhus and typhoid fevers (1837); John William Draper (1811–1882), a native of England, professor of chemistry in the University Medical College of New York (1841) and an eminent scientist, whose "Human Physiology" (1853) was the first work in this country illustrated by micro-photographs; Alonzo Clark of New York (1807–1887), Professor of Physiology and Pathology in the College of Physicians and Surgeons, 1840–1855, and of Pathology and Practical Medicine, 1855–1884, the introducer of the opium treatment of peritonitis in 1840, and for many years the first consulting practitioner and most highly esteemed medical teacher of New York City, and numerous others.

Among the more eminent living general physicians of the United States it is sufficient to notice: Alfred Stillé of Philadelphia, author of numerous valuable treatises on medical subjects; Nathan Smith Davis of Chicago; Henry I. Bowditch of Boston, who was the first to announce the dependence of phthisis upon dampness of the soil (1862); William H. Thompson, Alfred L. Loomis, William H. Draper, John T. Metcalfe, Abraham Jacobi, Francis Delafield, Edward G. Janeway etc. of New York, Henry Hartshorne, William Pepper, John Forsyth Meigs, Roberts Bartholow, J. M. Da Costa etc. of Philadelphia.

The cultivation of specialties in the United States, now carried perhaps to an excessive extent, began about the middle of the present century. The earliest specialist is said to have been Dr. Horace Green (1802–1866), professor of Theory and Practice in the New York Medical College, who devoted his chief attention to diseases of the throat and larynx, and whose claim to have passed a sponge probang through the larynx excited much acrimonious discussion and occasioned the appointment of a committee of investigation. He published a "Treatise on the Diseases of the Air Passages" (1846), "The Pathology and Treatment of Croup" (1849), with other works. The invention of the laryngoscope by Czermak and Türck (about 1858) of course revolutionized the study of diseases of the air passages, and placed the specialty of laryngoscopy upon a sure basis. Czermak's first class in laryngoscopy consisted of Prof. Stoerck of Vienna, Prof. Lewin of Berlin, Dr. Semeleder, subsequently surgeon to the unfortunate Emperor Maximilian in Mexico, and Louis Elsberg (1837–1885), a native of Iserlohn, Prussia, but a resident of Philadelphia. Dr. Elsberg, on his return to the United States, was appointed Professor of Laryngology and Throat Diseases in the Medical Department of the University of New York (1861), where he established the first clinic for diseases of the throat ever instituted. He was also the founder of the New York Laryngological Society (1873), the American Laryngological Association (1878) and the "Archives of Laryngology" (1880). To the energy and enthusiasm of Dr. Elsberg the specialty of laryngoscopy owes much of its success in this country.

Among the very numerous successful laryngoscopists in the United States we may mention J. Solis Cohen of Philadelphia (Diseases of the Throat, 1872), Carl Seiler (Handbook of the diagnosis and treatment of diseases of the throat, nose and naso-pharynx, 2d. ed. 1883) and Charles E. Sajous, likewise of Philadelphia; George M. Lefferts, F. H. Bosworth, Beverly Robinson, Andrew H. Smith, Luis Sass, Clinton Wagner, Rufus P. Lincoln etc. of New York, F. H. Hooper of Boston, E. Fletcher Ingalls of Chicago, John N. Mackenzie of Baltimore etc.

The subject of the Diseases of the Skin attracted attention in this country at an early period. The "Abrégé pratique des maladies de la peau etc." of Cazenave and Schedel (1828) was translated and published in 1829 by R. E. Griffith of Philadelphia, and the English translation of the same work by Thomas H. Burgess (1842) was republished in New York, under the editorial care of H. D. Bulkley, in 1845 and again in 1852. Dr. Bulkley who, in conjunction with Dr. John Watson (1807–1862), established in 1836 a dispensary for cutaneous diseases, subsequently known as the "Broome St. School of Medicine", in his preface to the edition of 1845 speaks of having used the manual of Cazenave and Schedel "in several successive courses of lectures on the subject in this city", and was, so far as I know, the earliest lecturer on dermatology in this country. Wilson's "Lectures on Diseases of the Skin" (1842) had reached a fourth American edition in 1859, and the "Practical Treatise on Diseases of the Skin" by J. Moore Neligan of Dublin, published in 1852, had attained its fourth American edition likewise in 1864. The New York Dermatological Society was organized in 1869, and the American Dermatological Association in 1876. A series of photographs of diseases of the skin taken from life was published by Howard F. Damon of Boston in 1867, and a treatise on the recent advances in the pathology and treatment of diseases of the skin by B. Joy Jeffries of Boston formed the Boylston Prize Essay of 1871. A valuable monograph on "Herpes Gestationis" was also published by L. Duncan Bulkley of New York in 1874, and an "Analysis of 1000 cases of Skin Diseases" by the same author appeared in 1875. But the first systematic treatise on dermatology by an American author was "An Elementary Treatise on Diseases of the Skin etc." by Henry G. Piffard of New York, which was published in 1876. In the same year appeared the First Part of Louis A. Duhring's "Atlas of Skin Diseases", and in 1877 "A Practical Treatise on Diseases of the Skin" by the same author (J. B. Lippincott & Co., Philadelphia).

Among the very numerous American dermatologists of the present day we may mention, besides those already noticed: R. W. Taylor, G. H. Fox, C. Heitzmann and A. R. Robinson of New York; F. B. Greenough, J. C. White and Edward Wigglesworth of Boston; H. W. Stelwagon of Philadelphia; W. A. Hardaway of St. Louis and J. Nevins Hyde of Chicago (A Practical Treatise on Diseases of the Skin, 1883).

In the department of the Diseases of Children the works of William Potts Dewees (1768–1841; A Treatise on the Physical and Medical Treatment of Children, 1825), whose treatise reached a tenth edition; D. Francis Condie (1796–1875; Diseases of Children, 1850) and John Forsyth Meigs (Practical Treatise on the Diseases of Children, 1857, with numerous later editions) are well-known. More recently the "Treatise on the Diseases of Infancy and Childhood" of J. Lewis Smith of New York, which appeared in 1869 and is now enjoying its sixth edition, has almost monopolized the field in this department. The various monographs of Abraham Jacobi, Clinical Professor of the Diseases of Children in the College of Physicians and Surgeons, New York, also deserve mention in this connection.

During the early years of the present century the chief authorities for American physicians in the department of Venereal Diseases were John Hunter (On the Venereal Diseases, 1786) and F. X. Swediaur (1748–1824), whose "Traité complet sur les symptomes, la nature et le traitement des maladies syphilitiques", Paris 1798, was translated into English by Thomas T. Hewson of Philadelphia in 1815. A treatise "On Gonorrhœa and Syphilis" by Dr. Silas Durkee, Fellow of the Massachusetts Medical Society, seems also to have enjoyed considerable popularity, claiming a fifth edition as late as 1870. It was not, however, until the translation of Ricord's edition of the treatise of John Hunter, made by Freeman J. Bumstead (1826–1879), Lecturer on Venereal at the College of Physicians, New York, in the year 1859, and particularly not until the appearance of the treatise on "The Pathology and Treatment of Venereal Diseases" by the same author in 1861, that the subject of venereal disease assumed in this country a thoroughly scientific position. This last work presented to the American medical profession for the first time a complete and systematic view of the advances made by Bassereau, Fournier etc. in the differentiation of the "chancroid" and the "true chancre", and opened the way for a scientific system of treatment in the management of the various diseases arising from impure sexual intercourse.

Among the more eminent specialists in the department of Venereal were and are: the distinguished surgeon of New York, William Holme Van Buren (1819–1883), Professor of the Principles of Surgery in Bellevue Hospital Medical College, who, in conjunction with Edward L. Keyes, published in 1874 an excellent "Practical Treatise on the Surgical Diseases of the Genito-Urinary Organs, including Syphilis"; R. W. Taylor, the present editor of Bumstead's standard work and author of numerous and valuable monographs on the subject of Venereal (Syphilitic Dactylitis, 1871, etc.); Fessenden N. Otis of New York; F. R. Sturgis and M. H. Henry, also of New York, the latter the editor of the American Journal of Syphilography and Dermatology (1870–75), and numerous others.

In the department of Diseases of the Mind and the Nervous System Benj. Rush's "Medical Inquiries and Observations upon Diseases of the Mind" (1812), and the "Medical Jurisprudence of Insanity" (1838) by Dr. Isaac Ray (1807–1881) are old and valued works. The treatise of Isaac Parish of Philadelphia on "Spinal Irritation" (1832) has been already noticed. We should also mention the names of the eminent alienists: Amariah Brigham (1798–1849), Superintendent of the Utica Insane Asylum from 1842 until his death, and editor of the "American Journal of Insanity (1844–49); Pliny Earle (born 1809), Supt. of the Bloomingdale Asylum in New York City (1844–49), and subsequently Supt. of the Massachusetts Asylum at Northampton; Thomas S. Kirkbride (1809–1883), Supt. of the Philadelphia Asylum for more than forty years; John P. Gray (1825–1886), Supt. of the Utica Insane Asylum for 32 years and editor of the "Journal of Insanity"; Charles H. Nichols of the Bloomingdale Asylum; John C. Curwen of Pennsylvania; Walter K. Kempster of Wisconsin; Joseph Parrish of Philadelphia, founder in 1870 of the American Association for the Cure of Inebriates, and Daniel H. K. Kitchen of New York, Physician to the Inebriate Asylum at Binghampton. Among the more recent cultivators of this branch of medicine we may mention Meredith Clymer (Notes on the Physiology and Pathology of the Nervous System etc., 1870, with numerous monographs on nervous diseases); S. Weir Mitchell of Philadelphia (Injuries of nerves and their consequences, 1872, with very numerous monographs); William A. Hammond of Washington (A Treatise on the Diseases of the Nervous System, 1871, etc.); Allan McLane Hamilton of New York (Nervous Diseases, 1878); Edouard S. Seguin (1812–1880) of New York, a native of France and founder in 1839 of the first institution for the instruction of idiots and feeble minded children, a class of unfortunates in whose behalf his talents were exercised likewise in his adopted country; his son Ed. C. Seguin; Edward C. Spitzka, Ambrose L. Ranney and Allen M. Starr of New York;

Horatio C. Wood, Charles K. Mills, James A. Meigs (1829–1879) and Wharton Sinkler of Philadelphia; Charles F. Folsom, James J. Putnam and Francis Minot of Boston; Henry M. Lyman of Chicago; Francis T. Miles of Baltimore; Landon Carter Gray of Brooklyn; J. S. Jewell of Chicago, etc. etc.

The specialty of Electrotherapeutics is represented by George M. Beard (1840–1883) and A. D. Rockwell of New York, authors of "A Practical Treatise on the Medical and Surgical Uses of Electricity etc.", 1871; William B. Neftel of New York (Galvano-Therapeutics, 1871); D. F. Lincoln of Boston (Electro-Therapeutics, 1874); Roberts Bartholow of Philadelphia (Medical Electricity, 3 ed., 1887); Allan McLane Hamilton (Clinical Electro-Therapeutics, 1873), Charles K. Mills of Philadelphia, John Byrne of Brooklyn (electro-cautery) and numerous others.

Ophthalmic Medicine, particularly its operative department, continued a branch of general surgery until quite the middle of the century. Indications of the coming separation, however, were manifested early in the century by the foundation of the New York Eye and Ear Infirmary in 1820, the Pennsylvania Infirmary for Diseases of the Eye and Ear in 1822, the Massachusetts Eye and Ear Infirmary in 1829 and the Wills Ophthalmic Hospital in 1834. The earliest independent writer upon ophthalmic diseases in the United States was Dr. George Frick (1793–1870) of Maryland, who published in 1824 "A Treatise on Diseases of the Eye, including Doctrines and Practice of the Most Eminent Surgeons, and particularly those of Prof. Beer." Dr. Frick, though a native of the United States, was of German descent and died in Dresden. His work was quoted with respect by European writers, and the book survived three editions (Quinan). Other early ophthalmologists were: Edward Delafield (1794–1875), President (1858–1875) of the College of Physicians and Surgeons of New York, and one of the most highly esteemed physicians of that city. As early as 1826 Dr. Delafield, then Prof. of Obstetrics and the Diseases of Women and Children in the College of Physicians and Surgeons, delivered a special course of lectures upon diseases of the eye, and at the same time the Eye and Ear Infirmary was thrown open for clinical instruction. Dr. Isaac Hays (1796–1879) of Philadelphia, the eminent editor of the "American Journal of the Medical Sciences", was also much interested in the subject of ophthalmology, was one of the surgeons of the Pennsylvania Infirmary for Diseases of the Eye and Ear and of the Wills Hospital, and edited in 1843 Sir William Lawrence's famous "Treatise on the Diseases of the Eye", to which he made numerous and valuable additions. Dr. Hays also invented a peculiar cataract-knife, a new operation for strabismus, was one of the earliest oculists to detect astigmatism and one of the early investigators of color-blindness. John Dix of Boston is said to have written on strabismus in 1841, and James Bolton (1812–1869) of Richmond, Virginia, published in 1842 "A treatise on strabismus — with a description of new instruments etc." — The *specialty* of ophthalmology, however, may be said to have been created by the invention of the ophthalmoscope by Helmholtz in 1852, and from that date forward the subject of diseases of the eye has become more and more markedly separated from general surgery. The earliest physician in the United States to cultivate ophthalmology as an exclusive specialty is said to have been Dr. Elkanah Williams (1822–1888) of Cincinnati, who studied in Prague, Vienna and Berlin, and on his return to this country in 1855 began an exclusive practice in diseases of the eye. Among the more eminent ophthalmologists of recent date we may mention: Drs. H. W. Williams, Oliver Wadsworth, Hasket Derby and B. Joy Jeffries of Boston; the lamented C. R. Agnew (1831–1888), Hermann Knapp, Edward Loring (1837–1888), Richard H. Derby, F. D. Noyes, D. B. St. John Roosa, David Webster, etc. of New York; George C. Harlan, Wm. F. Norris, William Thomson, George Strawbridge, Edward O. Shakespeare and others of Philadelphia; Swan M. Burnett of Washington; George Reuling and J. G. Chisholm of Baltimore; John Green of St. Louis, and very many others.

The specialty of Otology, almost universally associated in practice with ophthalmology, is represented, besides the ophthalmologists already mentioned, by Albert H. Buck and Oren D. Pomeroy of New York; Charles H. Burnett and Laurence Turnbull of Philadelphia; Samuel Sexton of New York; Clarence J. Blake and J. Orne Green of Boston; Samuel Theobald of Baltimore; W. W. Seely of Cincinnati, and numerous others.

The department of Forensic Medicine or Medical Jurisprudence has found able representatives in James Stringham (died 1817), Professor of Legal Medicine in Columbia College and subsequently (1814) in the College of Physicians and Surgeons, N. Y., and the earliest (1803) lecturer on this subject in the United States; his successor in the latter institution, John W. Francis (1789–1840); Theodoric Romeyn Beck (1791–1855; Elements of Medical Jurisprudence, Albany, 1823), whose treatise survived 12 editions and was translated into German and Swedish; Stephen W. Williams (1790–1855), Prof. of Legal Medicine in the Berkshire Medical Institute (1823–1831) and subsequently in Dartmouth College, who published "A catechism of medical jurisprudence", Northampton, 1834; Isaac Ray, who has been already mentioned; Moreton Stillé (1822–1855), whose "Medical Jurisprudence", published in conjunction with Francis Wharton, appeared at Philadelphia in 1855; William A. Hammond (Insanity and its medico-legal relations, New York, 1866); John James Reese, Prof. of Medical Jurisprudence and Toxicology in the University of Pennsylvania, and editor of the 8th American edition of Alfred S. Taylor's well-known and popular "Manual". H.]

h. The School of Natural Philosophy

in Germany ran parallel with that of Broussais and the beginning of the tendency to pathological anatomy in France, and in its offshoots reached to the golden age of these systems, and of the Dublin School which we have just discussed. It was, on the one hand, the ultimate branch of the medical philosophy of the 18th century, which had originated, indeed, in Germany, and it must be regarded, on the other hand, as a revival in our land of opposition to medical philosophy on the side of Realism. In both points of view it is equally important and remarkable in the history of culture. In the direction last mentioned its influence was, indeed, only indirect, yet was it none the less powerful. It led speculation into extremes, and nothing could better level the way in Germany for the opposite philosophy than precisely those excesses of which the school of natural philosophy was guilty. These finally sobered down through the inanity of scholastic phrases, with their often obscure and "half-born" ideas, and thus broke a broad road for the subsequent enthusiasm in behalf of the one-sided and positive French medicine. For throughout all the history of medical culture it is a manifest law, that the one-sidedness and exaggeration of any existing school prepare the way for, and lend the most active aid to, the opposition of the future. This historical task, albeit a thoroughly negative one, the medicine of natural philosophy performed, and so thoroughly too, that ultimately the realistic school could, and did, without any serious struggle, step into its place.

How nearly the two extremes meet is proven, among other things, by a lecture received "with loud applause" in the Convention of Naturalists (Naturforscherversammlung) at Gratz in the year 1875, and which by its natural scientific speculation on the subject of inductive morals etc. approximates so closely in its conclusions and mode of expression — le style c'est l' ecole is in medicine more accurate than le style c'est l' homme, even in the age of the natural sciences — to the earlier speculations of natural philosophy, that the new method cannot be distinguished from the old. In this lecture the anthropology of the present day supplies the sphere in which both extremes come into such wonderfully close contact, as a comparison with the following statements will show. The whole lecture is a kind of cerebral phrenology, instead of the craniology of Gall. Among other things, the speaker, while laying express claim to a thoroughly natural scientific stand-point — he even speaks of "individuals ethically stunted in a natural scientific sense", and none of the naturalists entered any protest — declares. "The laws of equilibrium of the momentary feelings of pleasure and dislike in contrast to the purposes of life and the interests of the preservation of the species, and between the feelings of pleasure and dislike of individuals and those of the community, are the laws of equilibrium of moral perception." After speaking of ethical, intellectual and motor talents, the orator (his name is unimportant in this connection) brings forward the scientific analysis of the brains of three homicidal robbers, and on this occasion uses the following language: "When I had freed the first brain from its envelopes the crime at once met my view with unmistakable anatomical (!) clearness" (something as it did the prophet Lavater when he looked upon a silhouette). But then he asks himself the question: "Is this a scientific accident, or a typical occurrence?" and comes to the elevating conclusion: "It seems to me as if from the sight of the brains of these robbers and murderers a movement will go forth over distant zones and remote ages which will draw the doctrine of right and justice into the ethically emancipating domain of anthropology."

Yet the school of natural philosophy, which, by the way, consisted almost entirely of men of importance, physicians worthy of being called "men of two centuries", won a following in Germany alone, manifestly in consequence of the always speculative tendency of German thought, a tendency measurably lacking in other people. In this tendency the school of natural philosophy must have largely rooted itself, since otherwise it cannot be readily explained how so many intelligent and really important investigators and savants belonged to its fold. For however justly the one-sided speculative tendency of this school is despised, the intellectual eminence of the majority of its representatives must extort the greatest respect. An abundance of imbecile representatives, such as was plainly manifested by the so-called "Natural-Scientific School" (in spite of "zealous investigators", who, inasmuch as they were ever investigating, did, indeed, all discover something, although often this something was of no importance), cannot certainly be charged upon the school of natural philosophy, which, above all other schools of our century, includes physicians eminent for their universal culture. Its fault is merely a too one-sided, and therefore erroneous conception and consideration of the subjects of medical science. Indeed, even to-day we adopt for the foundation of our knowledge many of the definitions which originated in this school, e. g. that of disease etc. The school of natural philosophy brought forth mainly a speculative philosophy of medicine, not a philosophical medicine such as Hippocrates demanded, although many of the followers of this school believed that they had attained the latter desideratum. It did not create a medicine which cultivates assiduously realistic investigation with the assistance of sensible observation, though without crowding speculative thought entirely out of the science. Its medicine was purely speculative.

This result was based upon the very nature of the intellectual and actual founder of the school — Schelling — who, though originally a physician, became ultimately exclusively a philosopher. Next to Schelling, Marcus, who with the former edited the "Jahrbücher der Medicin als Wissenschaft", had a decisive influence upon the origin and tendencies of the school.

In the school of natural philosophy use was made of the abstract doctrines of the philosophy of identity, and the imponderables — electricity, chemical forces, magnetism — with their "polarities" and indifferences, were especially employed as its scientific basis. Contrasted with the imponderables were the "dimensions" of matter, as well as the qualities of sensibility, irritability and reproduction or metamorphosis. The undisturbed or changed co-operation of these agencies furnished the abstract conceptions of health etc. In such formulated distinctions, stated differently by each physician of the school, and expressed in the most affected scholastic and artificial terms, distinctions, however, which not infrequently contained a sound germ of actual truth (obscure, alas, in phraseology and misinterpreted), the school of natural philosophy wasted its strength and its credit. For of course in this characteristic lay the germ of endless sports of fancy and of the maddest phraseological subtilties, into which its efforts at systematization finally degenerated.

On the side of actual facts, however, the school of natural philosophy did not entirely fail in attaining great benefit for, and bringing considerable profit to, the medicine of the following age. It exercised its greatest, and in many respects, undoubtedly, a very serviceable, influence upon the department of the history of development or physiology, where a Joh. Müller displayed his thorough profundity.

Distinguished representatives of this school in both its best and worst aspects, and physicians who enjoyed in their own day an extraordinary reputation, to which, if we only eliminate this worst side as belonging to the spirit of the age, they might likewise lay claim among posterity, were: the naturalist

LORENZ OKEN (properly Okenfuss, 1779–1851) of Bohlsbach in the Bavarian highlands,

successively professor of medicine (1807), natural history and philosophy (1812) in Jena. Subsequently becoming involved in some examinations connected with the "Isis", in which, however, he was acquitted, he became a private savant. In 1828 Oken was again made professor of physiology in Munich, from which place he was "transferred" to Erlangen, and in consequence resigned his professorship. In 1832 he was appointed professor in Zürich. Oken was likewise the founder of the "Wanderversammlungen der Naturforscher", the first of which met in Leipsic in 1822. By his "Naturgeschichte", a book which had a most extensive circulation (its atlas a short time ago was sold as a Christmas picture-book for children — sic transit gloria librorum!), he contributed greatly to the popularization of natural history, and his journal, the "Isis", united the labors of the best minds of the day. Politically Oken belonged to the democrats, then known as "Demagogen" (Burschenschaftler, Tugendbündler), a party which also counted among its adherents Dr. Eugen Höfling (born in Fulda in 1808, for a long time a privatdocent in Heidelberg, then a practitioner in Eschwege, where he died in 1880), the poet and author[1] of the famous students' song "O alte Burschenherrlichkeit" etc., with many other followers of the school of natural philosophy. The members of this party were persecuted and frequently punished with prolonged imprisonment.

Oken explained the skeleton as a vertebra, discovered the Wolffian bodies in the mammalia etc., but regarded the "infusoria" (by which he understood what we now call cells), and particularly the infusoria in the semen, as the essential agents in generation. "Putrefaction is nothing but a separation of organic matter into simple little cellules or points, the infusoria. If these adhere again, they give rise to higher plants or animals, so that we may regard flesh as a crowd of numerous infusoria grown together, and thus forming, as it were, the seed for the entire animal kingdom." He also believed that it might be assumed that the first generations of women had lived without menstruating, and that the process of menstruation first orginated when the natural desires of women were not satisfied etc. "Life in his view is the self-generation of the individualized elements; the principle of life is galvanism; vital force is galvanic polarity. Carbon is the fundamental matter of the universe. Mixed with water and air it produces mucus. Everything has been created from the "Meerschleim" (sea-ooze), the primeval mucus, a doctrine in which a very manifest sympathy with the "newest" and synthetic tendency of natural philosophy is to be recognized, though in Oken's day philosophers were as yet in no condition to construct a scientific genealogical tree of creation. With Kieser and Döllinger, Oken contributed greatly to the establishment of the modern theory by the introduction of the microscope into medicine (Rohlfs), and by his "infusoria", from which he believed the whole body to be constructed, he approximated in principle to the cellular theory of Virchow. Agassiz in his "Memoirs" declared Oken "a master in the art of teaching, a courageous and ruling spirit, who constructed the entire universe out of his own brain, and derived from à priori conceptions the connexion of the three kingdoms into which he divided all living creatures." Alex. Braun, the botanist of Giessen and one of Oken's pupils, said "His auditors were compelled occasionally to yield their ears to a little nonsense", as e. g. the following passage: "Man stands as much higher than woman as the sexual plant stands above the sexless . . . . the male in the entire animal kingdom stands higher than the female. Snails, fish and aquatic animals are the woman; birds, and mammals the man. Ideally every child should be a boy. When female children are produced, it occurs through a miscarriage of the female plan. Nature desires to attain the highest only, that is the man." (l. c.)

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[1] We mention this fact because the man has impressed, elevated and refreshed by his poem more youthful hearts, than he could ever have done in the position of a professor of medicine by his writings on natural philosophy!

Joh. J. Dömling, professor in Würzburg (1771–1803), August Winkelmann, K. Chr. E. Schmidt (died 1813), professor in Jena (physiology treated philosophically) and Windischmann sympathized with Brunonianism. The same may be said of the able, highly esteemed and versatile

Ph. Franz von Walther (1782–1849), professor of surgery in Landshut, Bonn and Munich,

who held the true essence of the organism to be that "it admitted no division of the idea of life. The fundamental functions of life are self-production, irritability and sensibility, to which correspond in organic nature magnetism, electricity and chemical action (Chemismus)" etc.

Ignaz Döllinger (1770–1841) of Bamberg, professor in Würzburg and Munich,

the distinguished father of the cautious leader of the "Old Catholics", rendered special service in the departments of the history of generation and development, physiology and comparative anatomy. He was one of the most influential members of the school of natural philosophy, the teacher of many eminent men, e. g. E. O. Baer etc. Agassiz, also one of his pupils, calls him in his "Memoirs" a persevering and exact investigator and observer, who gave unreservedly to his pupils the results of his investigations, though he published them with reluctance. He regarded "coitus as something intermediate between irritation and infection. The seed of the uterus is the blood, which mingles with the male blood, and from this commingling originates a polypus." Döllinger held that the Graafian vesicles reached the uterus and so worked upon the semen "that it follows the laws of woman's nature and also becomes a vesicle, between which two vesicles there exists an opposition that the polypous structure of the uterine blood adjusts. Thus occurs conception, and all subsequent cohabitations are repeated between the individuals as mere acts of the species."

KARL FRIEDRICH KIELMEYER (1765–1844),
professor in Stuttgart and Tübingen, who labored in behalf of comparative anatomy, did honor to himself in this respect by his pupil Cuvier.

JAC. JOS. GÖRRES (1778–1848) of Coblenz,
the much persecuted and most fruitful writer of this school, deserves notice, not, indeed, as a physician, but merely in a wider sense for his influence upon its tendencies. "We find in external nature three positive factors: light, electricity and oxygen: and three negative: phlogiston, magnetism and combustible matter. From the reaction of both of these factors there result three ideals: warmth, galvanism and combustion. Three positive factors meet us in internal nature: idea, affection, motion etc.

Eminent followers of the philosophy of nature, and physicians and investigators who rendered special service in physiology, anatomy and the history of development, were also: Reil; Georg Prochaska (1749–1820), Leopold Reinhold (1769–1809) and Ignaz Paul Vitalis Troxler (1780–1866),
a professor in Bern. Troxler was one of the most decided followers of Schelling, and like his master rather a philosopher than a physician. He finally lapsed into Catholicism. "Everything therefore which we characterize with life, is merely the life of a definite individuality. Absolute life is expressed in the universe and in its highest individuals. On its material side it is modeled in the forms of the terrestrial system, in the stars; on its dynamic side, in the motions of that system. The life of substance, in and for itself, is nothing but the unity of the principles of light and gravity. — Life in its inmost character is individual productivity, in which the producing agent and the product are interwoven under the form of self-determination and determinability. As the factors of life are the principles of light and gravity, so, on its side, life itself is the principle of light and gravity. — Excretion is secretion directed externally, and secretion is excretion directed internally. — Respiration and digestion are identical in their essential tendency, and differ only in their relative direction." (See Rohlfs: Umrisse etc.)

GOTTFR. REINHOLD TREVIRANUS (1776–1837) in Bremen
introduced the use of the microscope into general anatomical investigations and "laid the foundation of our present microscopic anatomy." He discovered in 1835 the rods of the retina, and regarded them as the terminations of the optic nerve, an idea confirmed subsequently by Heinrich Müller in his famous "Anatomisch-physiologischen Untersuchungen uber die Retina", 1856. Treviranus also made the first accurate measurements of the human eye in 1828. Zehender in Rostock says of him: "Treviranus was an ingenious and thoughtful man, a characteristic which must, indeed, have justly gained him many followers, but which renders his qualifications for a naturalist, in the present sense of that term, somewhat doubtful." Does this view of the doubtfulness of the possession of spirit and ideas as a qualification for a naturalist, in the modern sense of the term, hold good to-day?

To these we may add: W. A. Stütz; Carl Eberhard Schelling (1783–1854), a physician in Stuttgart; Joh. Bernhard Wilbrand (1789–1846), author of "Grundsätze der philosophischen Naturwissenschaft", 1806, etc., and a professor in Giessen, who up to the day of his death denied the circulation of the blood; the obstetrician Ritgen; Karl E. von Baer

(1792–1876) of Esthland, professor in Dorpat, Petersburg and Königsberg, the famous naturalist and embryologist, who discovered the ovum of mammals in the year 1827 and "fifty years ago gave to morphology its genetic foundations", as Häckel says in his dedication. Von Baer was incited to his investigations by those of Christ. Pander (1793–1865) on the development of the chick (1817). He distinguished himself as an anthropologist, geographer and writer on natural science, and in conjunction with Rudolph Wagner (1805–1864), author of the "Handwörterbuch der Physiologie, 1843–53, an investigator of merit but involved in Pietism, called in 1861 an anthropological convention, at which the anatomists Vrolik of Amsterdam, Weber of Leipzig, Bergmann of Rostock and others made their appearance. This was the origin of our "Anthropological Congress" of the present day. Franz Jos. Schelver (1778–1832), professor in Heidelberg; Joh. Heinrich Ferd. Autenrieth (1772–1835), professor in Tübingen, who like the already mentioned Brandis, Humboldt and others, regarded the physical imponderables as the first cause of life. He also brought forward the so-called "Krätzmetastasen", and may be considered in many respects the predecessor of Schoenlein. Ernst Bartels, professor in Helmstädt; J. Chr. Aug. Heinroth in Leipzig; the pharmacologist Sobernheim; K. F. Burdach (1776–1847), professor in Leipzig, Dorpat and Königsberg; C. G. Carus; the Würzburg physiologist Johann Jacob Wagner (1775–1821), author of a treatise entitled "Von der Natur der Dinge", 1803.

Wagner applied natural philosophy not only to medicine but also to the natural sciences. Yet "he shed no light upon the principles of those sciences, but rather clothed them in a dark mystical cloak" (Rohlfs). The "Turnerfeind"

Henrik Steffens (1773–1845), author of "Grundsätze der philosophischen Naturwissenschaft", 1806, and other works.

"He endeavored to divide remedies in accordance with conceptions of the ideal and the real." . Heine said of him: "Herr Steffens might complain more than his master that his ideas were stolen. Among his ideas, however, there was one which no one has appropriated, and this is his chief, his sublime idea: I, Henrik Steffens, born the second of May, 1773, at Stavanger, near Drontheim in Norway, am the greatest man of my century." (See Rohlfs, Umrisse.) Göthe thought Steffens gave one enough to think about, since ordinarily one lived with him in discordant concord.

Besides Windischmann, who has been already mentioned, we must reckon among the Mystics of the school of the philosophy of nature, or the Supernaturalists, many of whom also cultivated animal magnetism, the following physicians: Jos. Ennemoser (1787–1854) of Tyrol, private secretary of Hofer in 1809, professor in Bonn, and finally a private physician in Munich; K. Ad. Aug. von Eschenmayer (1768–1852), professor in Tübingen; Joh. Nep. von Ringseis (1785–1880) of Schwarzhofen in the Oberpfalz, professor in Munich, ordinary physician and travelling companion of Ludwig I., and author of a "System der Medicin" (1841), which defines the task of medicine as follows: "To prevent and cure diseases, and to assist in the improvement of humanity, a task whose thorough performance can be accomplished only in organic union with church, state and nature. The sole practical watchword is professional art; its condition, medical science." He also believed in the demoniacal origin of many diseases! Gotth. Heinrich von Schubert (1780–1860), professor in Erlangen and Munich; Franz Xaver von Baader (1765–1841), placed as a philosopher above Schelling and often made use of by the latter, a friend of the visionary Justinus Kerner, and according to David Strauss, "no poet, and just as little an observer, but a . . . . . gloomy, religious fanatic"; Leupoldt, who studied medicine historically on its objective and subjective sides, from the stand-point of a Christian and a German; and others.

From among the number of important practical physicians of this school we mention: Joh. Malfatti and the already noticed Joh. Ad. Schmidt of Aub, both professors in Vienna; Carl Himly (born 1772, drowned 1837), professor in Braunschweig, Jena and Göttingen, who has also been mentioned; his son Wilhelm (1800–1881), who was likewise professor in the university of Göttingen. — Among the oculists of this school belonged Beer (in part), and particularly Weller and Beck. The first believed that in the formation of cataract a galvano-electric process existed, inasmuch as there was a definite attraction of the plastic, crystallizing material between the uvea and capsular membrane, as well as between this and the ciliary processes etc. Weller explained staphyloma as follows: cornea and iris are different from each other, and between both is the indifferent aqueous humor. If this dualism ceases, "the cornea loses the property of expansion to correspond with the light, and the iris its peculiarity as an irritable structure of checking the light. Thus the point of indifference, the aqueous humor, disappears, and both fuse into an organic mass. In this productive activity now prevails, the new structure will abandon its active sense and now develops in the shape of spheres or cones" — an explanation which rather befogs than clears up the formation of staphyloma. — Friedr. Aug. Puchelt (1784–1856), a famous professor in Heidelberg, and Conrad Jos. Kilian (1771–1821), Docent in Jena, Würzburg, Leipzig and Bamberg, and then a practising physician in Petersburg.

Kilian was the proper systematist among the physicians of the philosophy of nature, and believed that it was impossible to define disease from the stand-point of experience. That this had been done hitherto he believed to have been the ruin of the sciences up to his own time. In his practice he professed to have lost but thirteen patients among 2000 whom he had treated; to be sure most of them suffered from nothing worse than the itch.

Joh. Spindler (born 1777), professor in Würzburg; Karl Georg Neumann (1774–1850), professor in Berlin from 1818 and finally a practitioner in Aachen; Christian Friedr. Nasse (1778–1851), professor in Halle and Bonn; Ludwig Vogel, a philosopher of nature on the subject of syphilis, who thought "that chemistry will succeed in liberating and separating the two spirits of the sublimate from the poisonousness which adheres to them from the depths of the earth", with others, were likewise followers of the philosophical school.

DIETRICH GEORG KIESER (1779–1862), professor in Jena, who with Oken, Luden, Fries and others stood upon the political proscription list of the Gentz-Metternich era, but with Oken, Doebereiner etc. made Jena in the beginning of the present century the pioneer university of Germany in the natural sciences, taught "that polarity, conceived as a phenomenon, is the basis of everything, since life is understood as an oscillation between a positive and negative pole, and the vital principle as the organic tension which kindles and supports this oscillation." He assumed for every disease a sensitive, animal and vegetative stadium, and regarded diseases as parasites, all capable of generation or infectious during their acme, a doctrine in which he was the forerunner of the theory of Parasitism subsequently so widely developed. This theory, indeed, is revived at the present day *mutatis mutandis* in the germ theory of disease, for in the "School of the Natural Sciences" much has been resurrected and become an article of faith which held a similar position in the school of the philosophy of nature. Even Mesmerism, which numbered Kieser, among others, with its followers, was almost restored to reputation. Kieser also held the horse-radish to be an "antitelluric" remedy, which dispersed somnambulism (System des Tellurismus oder thierischen Magnetismus, 1822 etc.)

Among the opponents of the school of the philosophy of nature we may give a prominent place to A. F. Hecker; Ph. C. Hartmann and Hahnemann.

From the names already mentioned of the followers of this school — we have designedly pointed out chiefly the extravagances of their doctrines — it becomes evident how many important men of science belonged to its fold. Apart too from philosophical technicism, and what seems at the present day like fancy, they introduced many permanent improvements into medicine.

The school was also of service in promoting the cultivation of medical subjects in the German language, and in aiding the latter to gain the supremacy. In comparison with the stereotyped therapeutics of the systems of the past, it likewise reawakened a better conception of medical practice, inasmuch as it kept itself free from therapeutic monstrosities. It is too an indirect service of this school that it did not create any system of natural-philosophical therapeutics. — Besides all this, it cultivated the study of the history of medicine, and in its method (by the way at least an ingenious and artistic one) did not satisfy itself with bibliographical notices etc.

As already pointed out, the catholicising, beatifying and hypocritical tendency of some physicians of the school of the philosophy of nature, and the play with words and disposition to half-true ideas and foggy conceptions of many of them, exercised a sobering influence upon the brains of other mortals. The philosophers of nature must be regarded in many respects as the Romancists (or "Teutomaniacs") of medicine. The medical, as well as the poetical, emotional, sentimental and idealistic Romancists,[1] who shuddered at anything sober, beclouded everything, the one the subjects of their poesy, the other the objects of their science. Both cultivated a tendency unproductive for the future on this very ground. Yet the philosophers of nature are of great importance and interest as an expression of the more ideal tendency of the age, of the spirit of the time which prevailed before our realistic philosophy, and they were too in several points of view of permanent value for the medical sciences, but more particularly in physiology and the history of development. They must be looked upon as the speculative predecessors of our present inductive anthropology, a department in which both by different methods of investigation meet.

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[1] Among the latter belonged in fact the physicians Achim von Arnim, Varnhagen von Ense, Justinus Kerner and others. In painting, the Idealists Cornelius (1783–1867), J. Fr. Overbeck (1789–1870) and the other Nazarenes belonged in this class, whose strength and weakness they shared.

The downfall of the school of the philosophy of nature was brought about by that change in the intellectual bent of the time which was completed in the Revolution of July, and which occasioned in Germany also the transition from the earlier idealistic era to the later, and now existing era of Realism and Materialism. Lange, in his ingenious history of Materialism, says on this subject: "Not only was the classical period over, but the Romancists had likewise sung themselves out; the Suabian school had passed beyond its bloom, and even almost everything of Heine's (a man who exercised a very important influence upon the new period), which is animated by an ideal spirit, precedes this turning-point. . . . Schelling, once the most conscientious supporter of the idea of the age, an overflowing apostle of production, produced nothing more. . . . Hegel, who seemed to rule the age, endeavored to confine the idea in ossified formulæ . . . Gervinus . . . entertained the idea that a period of politics must now follow. . . . He forgot . . . . that for the realistic period which now began, material charity and the development of industry occupied the first rank. . . Trade-unions and similar associations shot up during the thirties like mushrooms out of the ground; in the department of education, polytechnic institutions, schools for the education of artisans and commercial schools were founded by the citizens of flourishing cities. . . It is a characteristic minor feature of this period that gymnastic instruction, which had been done away with in consequence of its idealistic tendencies, was now again admitted from considerations of health. The chief activity of governments was devoted to matters of commerce, and the most important social and political creation of the entire decennium was the German "Zollverein". The railroads were still more important in their results. Just about the same time the interest in the natural sciences finally opened a road for itself in Germany, and the leading rôle was played by the science of chemistry. Berlin, by the labors of Alexander von Humboldt, Ehrenberg, Dove and the two Roses, the chemist and mineralogist, became one of the most important nurseries of science. With the men named was associated Johannes Müller, who, indeed, in his youth had passed through the school of the philosophy of nature, but without thus losing the sober energy of the investigator. By means of his "Handbuch der Physiologie" (1833), as well as his indefatigable activity as a teacher, he became the most influential pioneer of the strictly scientific direction of physiology. The works of Ernst Heinrich Weber (1795–1878), still more profound so far as regards mathematical accuracy, were a powerful support of this same tendency. To all this was added the fact that the French influence, at this time again very considerable in Germany, was entirely directed to the same side. The investigations of a Flourens, a Magendie, a Leuret and Longet in the department of physiology created an immense sensation in Germany, and prepared the ground for the subsequent appearance of Vogt and Moleschott. The greatest impulse towards the reform of Psychiatry came also from France; for nothing was suited to put an end for ever to the transcendental dreams of the theologising Heinroth and his followers, so much as the study of the works of the worthy Esquirol, which were translated into German in 1838. In the same year appeared also a translation of Quetelet's work "Sur l'homme" etc., in which that famous Belgian statistician sought to furnish a physiology of human actions based upon numbers. The writings of "young Germany" received, through the spirit of opposition, an importance, which raised them far above their intrinsic value. . . . . . Poesy might be terminated with the year 1830 and little of genuine importance would be missed. . . . A book "Das Leben Jesu" by Strauss, which appeared in 1835, struck at the very roots of the prevailing Christianity. With this book Germany undertook the rôle of leader in the struggle for free criticism of religious traditions. Historico-philological criticism too had already become the glory of German science."

From the intellectual substratum thus ingeniously sketched by Lange grew up the following new tendency in medicine.

1. The School of Natural History

was the immediate successor of the school of the philosophy of nature, and made already important concessions to modern Realism.

A picture so perfect, on the whole so profitable and so complete in itself, as the so-called school of natural history, is presented by none of the schools which have as yet risen during the 19th century, whether we regard the characteristics of its most important representatives, the solidity of their works, or even the time, duration and the country from which it derived its supporters and its fame.

The most prominent physicians of the school of natural history were from South Germany, especially from Bavaria, and were sons even of one and the same city. The same was the case, though not to the same degree, with the representatives of the school of the philosophy of nature. To this fact may perhaps be ascribed their similarity of character and their disposition to systematization, as well as the common aim of their literary services. The writers of this school cultivated more particularly the department of text-books, in fact that of clinical text-books, a department which corresponded to, and originated in, their tendency to the practical, in spite of all artificial nosological arrangement. In this lies the chief merit of the school, for it was this course precisely which finally opened an unobstructed path to the clinical method in Germany.

The period of existence of the school of natural history embraced about the years between 1830 and 1850; that of its fame, the forties. This fame expired not by a gradual extinction, but almost at once. The adherents of this school were almost all men of political enlightenment and independence, and observers as capable as clear and careful. None of them were bigoted enthusiasts or fanatics. Though a few of them committed theoretical and monstrous excesses, this only shows once again the ultimate destiny of almost all schools. Among these zealots belonged particularly those who were most devoted to the system of the philosophy of nature, and who, accordingly, were to be counted substantially followers and adherents of the latter school, rather than of the school of natural history, as e. g. the followers of the theory of Parasitism.

The new school was manifestly based partially upon that of the philosophy of nature. On its practical side, however, it sprung (though rather in accordance with its essence than its demonstrable source) from the more independent tendency of individual professors and famous physicians, who knew how to preserve themselves from domination by the omnipotence of the philosophers of nature. On both sides we enumerate here the physicians already mentioned: Frank, Joh. Heinr. Autenrieth, the pupil of Peter Frank; Nasse; Ernst von Grossi (1782–1829), professor in Munich and author of a famous treatise upon semeiology; Ferdinand Gottlieb Gmelin; Karl Heinrich Baumgärtner (1798–1886), the later cell-theorist, who appeared in this rôle even before Schwann (Rohlfs), and who was from 1824 clinical professor in Freiburg; above all, however, the model practitioners "old" Ernst Ludwig Heim (1747–1834) in Berlin, Stieglitz and Peter Krukenberg[1] (1788–1865) in Halle, the latter of whom was equal as a clinical teacher to the founder of the so-called school of natural history, and, indeed, in many respects surpassed him.

Krukenberg's therapeutic creed ran as follows: "The physician should be filled with a pious reverence towards nature. The organism is a whole, and must be contemplated in this sense. Our art is undoubtedly capable of decisive action, but let us not mistake the fact that in many cases its activity is quite superfluous, in very many null and inadequate, in many injurious. Indeed, what virtues are assigned to one and the same remedy! When we read these commendations we sometimes seem to be actually standing before the booth of a mountebank!" (See Rohlfs.) Words freighted with the spirit of truth, which cannot be reflected upon sufficiently, and which should be stored in the heart of all professional enthusiasts in medication!

In its special character as the result, as well as the successor, of the school of the philosophy of nature, the school of natural history — and still more its founder — borrowed and adopted a few abstractions of the former school, as e. g. certain fancies relating to electricity and certain chemical views. To these were added some ideas from Sydenham and even those of Paracelsus somewhat modernized (doubtless as the result of the study of that ingenious physician of the 16th century — a study prosecuted with special assiduity at this period), whose Tartaric diseases were already a sort of natural family, and who, accordingly, had already taken the direction of natural history. The most striking influence, however, was exerted by the botanical acquisition of a new classification, based upon so-called natural families, the principle of which was transferred into pathology. That this principle could be carried out only imperfectly, as well as that it was tortured by individual representatives of the school into an unnatural and strained position, although a germ of good derived from observation lay everywhere at the base of the whole, cannot be wondered at, when we take into consideration and comparison the history of other schools.

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[1] The one hundredth anniversary of his birth was celebrated with high festivities in Halle — an evidence of his importance in Lessing's sense!

The school of natural history was the expression of the turn which medicine was compelled to take to escape from the after-effects of the one-sided, ideal or systematizing tendency of the 18th century (of which natural philosophy was the final product), and to enter upon the realistic or positive tendency of science and culture in the 19th century in both medicine and the other sciences. It is in the most peculiar sense the school of transfer or mediation, historically, between the two tendencies, and therefore, besides systematic and merely nosological principles of arrangement, already displays a great number of realistic principles. It shows everywhere its mediatorial position between the old traditions and the most recent times. Thus, for the purpose of careful observation, it fostered, indeed, the ancient Hippocratic diagnosis and method, by which it preserved its connexion with the earlier medicine, and which the later school of natural science almost entirely set aside. In addition, however, it cultivated considerably the physical, and particularly the microscopic diagnosis adopted from France. Indeed this school gave a decisive impulse to microscopic investigation in general, so that Virchow, one of its scions, subsequently founded upon it his cellular pathology, and thus elevated the microscope to the fundamental instrument in pathology and pathological anatomy. It also appropriated chemistry and pathological anatomy, without, however, making the latter the main foundation of medical science and treatment, and without completely overlooking the dynamic element. "Physics or mechanics, on the other hand, it entirely neglected." It was too not yet entirely exact, though it concealed within itself the germ of that excellence and planted it in the field of medicine, inasmuch as it "considered medicine a part of the natural sciences and, accordingly, strove to cultivate it by the same method" from which the roots of exact investigation drew their nourishment. In therapeutics the school of natural history performed eminent service, and, indeed, it was the pioneer in a new system of therapeutics and practice. It did not sink into "scientific" medicine, and was unable to find satisfaction in purely expectant, symptomatic, physico-mechanical treatment.

The school too found its characteristic bond of union less in a system, than in the more external force of the nosological principle which it accepted. Its founder,

JOHANN LUKAS SCHÖNLEIN (1793–1864) of Bamberg,

had pursued his studies in Landshut, Wurzburg, Gottingen and Jena from the year 1811, and in 1819 settled as a privatdocent in Wurzburg. By the next year he became a professor in the latter city, where he remained until 1832, in which year, half compelled by his enlightened views in politics, he emigrated to Zürich, where he passed the period of his greatest fame. Here he remained until 1840, when, tired of Swiss republicanism, he went to Berlin to become a professor, physician-in-ordinary and ministerial counsellor, and to reap (although as Fanny Hensel-Mendelssohn relates, he was very rude) greater external, and particularly greater pecuniary success, than he could have attained in little Switzerland. He made greater and greater concessions to the dominant French school, and finally voluntarily vacated his place to the latter, in order to live until the close of his life in retirement in his native city, where he saw his system superseded. This retirement at the right time, as well as the fact that Schönlein himself wrote nothing except his inaugural thesis on "Hirnmetamorphose" (1816) and a paper on the triple phosphates, furnish rare evidence of practical judgment and self-restraint on the part of a university teacher. These virtues, so far as he did not possess them originally (which was very largely the case), he may have acquired particularly in Switzerland, the land of practical worldly-wisdom and practical tendencies. The lack of any book from his pen could only increase the number of his hearers, and the heightened impression of his living words was thereby attained to a degree which numerous editions of a written treatise could not have accomplished. The substance of his doctrines, however, is found in his clinical lectures at the Charité, edited by Güterbock in 1842. As a clinical teacher and practitioner Schönlein was one of the greatest men of our century. His only son Philipp died of climatic fever at the age of 22 at Cape Palmas during a journey in Africa. Gust. Nachtigal (1834–1885) died of the same disease, and is also buried at the same place. — It may also be mentioned that Schönlein discovered the Achorion Schoenleinii (1839) and the Acarus folliculorum.

Schönlein's doctrine of disease is founded in many respects upon earlier ideas, particularly those of Autenrieth and Stark (or rather on the dissertation of Stark's brother), and is on the whole decidedly ontological, though in particulars it is never held and carried out with inflexibility, a quality not characteristic of its inventor. Discoveries in pathological anatomy he regarded e. g. not as the results of previous disease, but as the concrete expression of the abstract, independent entity, "disease", whose relation to the organism he looked upon as that of a parasite sojourning temporarily in it, as a foreign organism in the originally simple organism — Paracelsus spoke of a microcosm within a microcosm — which in diseases of the skin e. g. blooms, deposits its fruit in the granary of the body etc., etc. In contrast with this botanical parallel, Schoenlein further distinguished the independent development of a disease as a kind of equivocal generation of infusoria, which brought about disease by means of infection, but as a true generation of a new individual disease. Against this entity, disease, pressing in from without, the body (as with Paracelsus) finds itself constantly in a state of defence. If this defence is successful, the body is healthy, or as Schönlein says: health is the balance, or better still the preponderance of the egoistic principle against the planetary, a definition which conceals a certain sympathy with the views of Paracelsus. Again, however, disease is the expression of the "reaction" of the organism — the fundamental constituents of which are "zoogen", blood and nervous tissue — against the inroads of the entity, disease. Fever in particular manifests itself as such a reaction, and accordingly essentiality does not belong to it, for it is not a disease, and is to be considered, both in itself and in its form, as merely an expression of the degree in which the system reacts against the local lesion, and opposes the hostile exciter of disease. The fever is synochal when the reaction is too strong, torpid when this is too weak, and it is called erethitic when the reaction and the force of the injury are equally balanced. The crises, in case they are general, follow only through the perspiration and the urine, but when they are local they manifest themselves in numerous ways, through all the other evacuations. What Schönlein says in this last respect of critical hæmorrhages reminds us at once of the views of Stahl.

"If the subject is young, critical hæmorrhages take place easily from the chest or from the nose, because in these years particularly the blood flows to the chest and the head. On the other hand, in old people hæmorrhages occur readily from the anus, because at this period of life the blood flows readily downward. Sex too has an influence upon the kind of hæmorrhage. Moreover in young subjects, particularly in synochal diseases above the diaphragm, nasal hæmorrhages are frequent" (this recalls Bordeu's doctrine of the pulse), "but in diseases below the diaphragm they occur from the nasal fossa of the same side, e. g. in inflammation of the liver, from the right fossa. In females hæmorrhages ensue from the sexual organs, even in diseases above the diaphragm. Individuals beyond maturity bleed from the rectum. Hæmorrhages from the lungs, the stomach and the urinary passages, if either too small or too large, are for the most part neither critical nor salutary. Local crises of the organs of secretion appear only in diseases of these organs themselves, or of those organs which stand in connexion with them. Thus in inflammation of the liver bilious fluxes arise: in inflammation of the spleen, vomiting of blood. If, however, the disease fastens upon an organ which presides over no secretion, the local crisis consists in an alteration in the functions of the part, e. g. when the brain is affected the crisis, in consequence of the importance of the injured part, is a fever-crisis, but the deep sleep may still be considered a local crisis. In seizures of the ganglionic nervous system, convulsions, e. g. in hysterical persons, are the change of function (See Wunderlich).

Natural history proper is first manifested in the "natural" classification of diseases, which are divided into classes, families and species or kinds, like the plants with de Candolle. These classes bear the names: I. Morphen; II Hämatosen; III. Neurosen, to which the "Syphiliden" are annexed.

Class I. consists of those diseases in which the "zoogen" (an arbitrarily assumed fundamental constituent of the living body) is altered, and it is divided into the following families: 1. Dysmorphen, or congenital malformations; 2. Theromorphen, or formations like the lower animals; 3. Hypertrophieen; 4. Atrophieen; 5. Stenosen; 6. Ectopieen; 7. Wunden.

Class II. contains diseases arising from changes in the blood: 1. Erythrosen: 2. Phlogosen; 3. Neurophlogosen; 4. Typhen; 5. Cyanosen; 6. Hämorrhagie; 7. Katarrhe; 8. Rheumatismen; 9. Erysipelaceen; 10. Impetigenes; 11. Skropheln; 12. Tuberkeln; 13. Phtisen; 14. Colliquationen; 15. Hydropsieen; 16. Dyschymosen; 17. Arthritiden; 18. Carcinomen.

Class III. is composed of disturbances of the nervous tissue: 1. Intermittentes; 2. Neuralgien; 3. Neurosen.

That the forcing diseases into genera and species must develop much arbitrariness is evident from the names of the various classes. Thus e. g. cancer of the liver falls into the family of "Tuberkeln"; chlorosis, into that of "Cyanosen"; gangrene of the uterus, among the "Neurophlogosen", and cholera among the "Katarrhe"! Nevertheless the school of Schönlein brought forward a sharper individualizing and characterization of the different diseases, as morbid processes of development of essential phenomena remaining identical in each individual case.

In therapeutics Schönlein was free from extremes, and for his age especially free from decided activity, in that he set aside the exciting method of treatment of Brown and Röschlaub and inculcated respect for the so-called critical efforts of the body. He also toned down the energetic venesection of a Marcus into a mild, antiphlogistic treatment, but yet in any given case did not recoil from energetic procedures. Among other methods, Schönlein laid stress again upon mineral springs more than had been done. If too, on the whole, he kept himself free from absolute faith in drugs, still he believed in a therapeutics, and was undoubtedly one of the most important practitioners of our century, resembling in many respects the English physicians.

Schönlein had the good fortune and the address to receive and to educate a number of eminent pupils, who honored him in their hearts and reflected upon him a portion of their own fame. He, however, accepted the calling and duties of an academic teacher most conscientiously, considering his position created by no means for himself but for the benefit of his pupils. Nor did he regard the reputation which he attained as a stepping-stone to a lucrative private practice, though the latter nevertheless fell to his lot and presented him with rich rewards.

One of the best known and most important of his pupils was the ever zealous Karl Canstatt (1807–1850) of Regensburg, professor in Erlangen, who was carried off prematurely by consumption. His "Jahresbericht" preserves the memory of his name, while his "Handbuch der medicinischen Klinik," 2d. edition, Erlangen, 1847, deserves to be studied even to-day and to serve as a model of instruction. We need disregard only its nosological, antiquated arrangement, which necessarily appears artificial, often strained and in fact incomprehensible, but yet does no harm to the substance of the work, which considers pathological anatomy, physical diagnosis etc., and furnishes a good system of therapeutics, save that it is often too much of a compilation. It makes numerous concessions to the anatomical tendency and to the doctrine of crases.

Canstatt's nosological arrangement is as follows:

I. Morphological part of the clinic. Elementary forms of disease.

II. Specific morbid processes.

  a. First class. 1. Order: specific exanthematous processes. 2. Order: malarious diseases. 3. Order: Typhus. 4. Order: Atmospheric diseases (diseases due to taking cold, Cholosen). 5. Order: Diseases due to animal poisons. Appendix: Toxicoses and developmental diseases. 6. Order: Chronic diseases (Syphilis, Lepra, Plica Polonica).

  b. Second class. Constitutional dyscrasiæ (Scorbutus, Werlhof's disease or purpura hæmorrhagica etc.)

III. Special local pathology.

- I. Diseases of the head. 1. Prolegomena to pathology and therapeutics. 2. Elementary forms of diseases of the head. I. Hypertrophy. II. Atrophy. III. Anæmia and hydræmia. IV. Hyperæmia, Stasis, Inflammation etc.
- II. Diseases of the spinal cord.
- III. Topographical pathology of individual nerves and nerve districts.
- IV. Diseases of the air-passages.
- V. Diseases of the organs of circulation.
- VI. Diseases of the arteries and veins.
- VII. Diseases of the chylopoëtic system.
- VIII. Diseases of the uropoëtic system.
- IX. Diseases of the genital system.
- X. Diseases of the peritoneum.
- XI. Diseases of the external integument.

Hydrophobia, glanders, syphilis, and gonorrhœa look curiously enough, according to our present views, in the class of cosmic diseases, and jaundice among the constitutional dyscrasiæ! Canstatt's "Krankheiten des höheren Alters" (1839) should also be mentioned.

Very popular too in its day was the "Lehrbuch der speciellen Nosologie und Therapie", 1845–48, of

Conrad Heinrich Fuchs (1803–1855) of Bamberg,

professor in Göttingen, whose classification of diseases dazes one with its uncommon names, e. g. Hämopexieen for diseases characterized by increased coagulability of the blood: Phlogose and Erysipelaceen; Parakrisien, for the diseases of secretion, among which figure Hydrochysen and Chymozemieen; Hämatophthoren (Typhus etc.); Dyscrasien with Chymoplanien, Kakochymien, Phymatosen, Carcinosen and Phtisen etc. Fuchs enjoyed especial reputation as a dermatologist, in which capacity, as in everything else, he proceeded to classify diseases after the method of natural history. His "Lehrbuch", with its curious nomenclature and arrangement, contains some good and acute observations, diagnosis, etiology and therapeutics. The last subject is treated even much better than in many more comprehensive handbooks of the school of the natural sciences. In this book on diseases of the skin, in its day so famous, he divides these diseases into: Rheumatic exanthemata (among which were Flussflecken and Giraffenausschlag); Gastric enanthemata and exanthemata (aphthæ, erythema, urticaria, phlyctænosis); Smegmorrhoeen (gneis, comedonen, acne); Acarpæ (Fratt or amorpha, lentigo, chloasma, argyria, pityriasis); Polycarpæ; Monocarpæ; Rosenformen; Scharlachformen; Blatternformen. Measles belongs in the class of Blennorrhoen. The character of the "Acarpæ" family is as follows: "Paracrisis of the parts of the skin which secrete the pigment or the epidermis; sometimes merely the formation of pigment, sometimes that of the epidermis only, is increased" etc. Characteristics of the family of "Polycarpæ" "Paracrises, in which the abnormal products (exudates) of the cutis are retained between it and the epidermis in the form of papules, vesicles, pustules, and numerous, usually slightly developed fruits of these germinate upon a common soil" etc.—At that time, as we may judge from these short extracts, greater importance was laid upon the constitutional origin of diseases of the skin, than is done by the school of Hebra at the present day.

A pupil and assistant of Schönlein was Dr F. Simon in Berlin, who died at an early age.

Karl Friedrich Marcus, Jr. (1802–1856), professor in Würzburg, acquired an eminent reputation as a clinician and diagnostician, though he became blind.

Gottfried Eisenmann (1795–1867) of Würzburg, in spite of his classification, was a distinguished observer and a good therapeutist. He discussed in monographs several "Families", e. g. the vegetative diseases in 1835, the families of Typhen, Pyren etc.

G. L. **Dittrich** (1815–1859), professor in Erlangen, the famous syphilographer and clinician, who specially developed the subject of visceral syphilis, and particularly its pathological anatomy, wrote, among others, on the family Syphilis. Bernard Mohr (died 1849) in Würzburg also belonged to this school, as well as the physiologist and pathologist C. H. Schultz-Schultzenstein (1798–1871) in Berlin, who was still a half-follower of the school of the philosophy of nature (Lehrbuch der allgem. Krankheitslehre; Die natürlichen Familien der Krankheiten etc.).

The diagnostician of the school was A. Siebert, professor in Jena, whose book ("Technik der medicinischen Diagnostik", 1844 and 1845, continued by a "Diagnostik der Krankheiten des Unterleibs", 1855) discussed at length, and from the stand-point of natural history, both general and special diagnosis, and was distinguished by great excellence in particulars combined with much oddity and mannerism in general style. The latter peculiarity may be illustrated by the following extract.

"Friend! I am sitting in a mountain cot; my window looks out upon a mirror-like sea, and goodly mountains, of elegant form, supply the background etc. Meanwhile we have to thank you physiologists for the best part of what we know and can make use of. Where, however, is your exactness? What was exact to you fifty years ago, is not so now, and him, who now looks around with the feeling of a lord from his petty mole-hill, the pioneer of half a century later looks down upon as a wanderer upon the clods of the marsh." Of the diagnostician Siebert demands: "The diagnostician must accustom himself to the government of all his moral and physical pathemata. He must keep his senses sharpened, and especially must he regard the relatives of the patient with a knowledge of human nature. Nothing should be undertaken regarding the sick which can make their sufferings worse, but in general we should treat them as far as possible with indulgence"— a piece of advice well worth consideration. "Do not question half-grown maidens on things which they cannot and should not know. Boys and girls and young persons often cannot be brought to speak until those under whose surveillance (!) they are placed have gone away"—and many similar precepts. According to his 27th precept, the physician "must be calm and earnest, gentle and firm, but in all cases sympathetic."

From this school sprung also Heinrich Haeser, the widely famous medical historian, particularly eminent for his history of epidemic diseases, and the author of many excellent works, all of which are composed from the philosophical (pragmatischen) stand-point, and devote but little attention to the history of culture. His "Lehrbuch der Geschichte der Medicin und der epidemischen Krankheiten", 3d. edition, 1875–1882, written largely from original sources, with the greatest erudition and devoting more attention to bibliography than the work of Sprengel, has secured a very wide circulation.

Haeser (born in Rome in 1811, died in Breslau in 1885) was successively a professor in Jena (he graduated here in 1834), Greifswald and Breslau (1863). In his day he was classed among the so-called

Parasitists,

that is among that section of Schönlein's pupils who considered diseases genuine second organisms in the diseased body, generated, developing and dying, the last either of themselves, i. e. through the activity of the mother organism, or by the power of drugs. In case of recovery they were supposed to be removed by the crisis as corpses of disease, and they were even regarded as capable of sickness in themselves.

Schönlein, about the close of the thirties, was the first clear supporter of the parasitic theory in many diseases, a theory inaugurated by Bassi's discovery of the fungoid nature of muscardine (demonstrated by Lebert in all tissues of the silkworm), and now popularized by the discovery of the bacilli etc.

Among those who elaborated this portion of Schönlein's doctrine belonged the "Ideal Parasitist", Haeser's teacher, Karl Wilhelm Stark (1787–1845), professor in Jena, ordinary physician of Karl August after the death of his father, and himself the father of the famous archæologist of Heidelberg, Karl Bernhard Stark (1806–1882). He was the author of a treatise entitled "Allgemeine Pathologie oder allgemeine Naturlehre der Krankheit". Robert Volz (1806–1882), chief medical counsellor in Karlsruhe and finally a member of the German Board of Health, and Ferd. Jahn, ordinary physician in Meiningen ("System der Physiatrik oder der hippokratischen Medicin), who accepted the existence of a natural healing power, which always acted suitably against the parasitic "disease" (Physiatrist).

An utterly fantastic direction was taken by

Carl Richard Hofmann (died 1851) in Erlangen and Würzburg, then medical counsellor in lower Bavaria, in his "Vergleichende Idealpathologie".

He defines disease as "an ideal organism, which must stand in harmony with the real organisms, and holds that the former develops after an abnormal type, regarding it as a reversion to a lower grade, so that the abnormality of the diseases of man may be found normal in beasts.

"Rhachitis consists in an unwinding (Herausschlingung) from the totality of human life, and a free, independent representation, of the ideas of the invertebrate animal. In rhachitis man endeavors to change himself into a soft animal or mollusk (!). Chlorosis is the chrysalid transformation of the human being; menstruation is the same as moulting in the lower animals; the phthisical is the human sylph (!!). Gout is a revival in men of the mures articulares (Gelenkmauser), regeneration through the joints. Hæmorrhoids are not varices, but crooked, animal limbs, crooked intestinal limbs (!!!). The cancerous dyscrasia consists in the effort of the organism to go apart again into the opposition of stock and polypi." This is nonsense, everyone thinks involuntarily; still there is method in it. We must certainly agree with Marx when he says: "There are books, like the one before us, which admit of no criticism from the stand-point of searching consideration." (See Rohlfs, "Die med. Klassiker Deutschlands," p. 396).

That such arbitrary and absurd ideas equalled the maddest whimsies of the philosophers of nature is quite manifest. It would be amazing that such things could have been done in our age, if the preceding history had not shown that our century has avoided theoretical monstrosities quite as little as any of the earlier ages.

Opponents of the school of natural history on the side of the philosophy of nature sprung up in Conradi, G. W. Scharlau, Lehrs and Ringseis. The latter called Schönlein, after his death, a plagiarist. The weightiest opponent, however, was Rud. Hermann Lotze (1817–1881) in Göttingen (called to Berlin before his death), a physician and philosopher, and as such a follower of Herbart, who appeared as a special opponent of Stark. Besides these, the following physicians combated both the natural philosophical and natural historical theories, though only substantially, and not by direct opposition, like those just mentioned. A. F. Schill (died 1839, Allgemeine Pathologie, 1840, published by V. A. Riecke) in Tübingen, who spoke in behalf of English medicine or rather of "Irritation"; Julius Vogel (1814–1880) of Wunsiedel, professor in Giessen and subsequently in Halle (Pathol. Anat. des menschl. Körpers, 1845; Anleitung der qualit. und quantit. Analyse des Harns, in conjunction with Neubauer), and Karl Ewald Hasse (born 1810), professor in Leipsic, Heidelberg and Göttingen (Anatomische Beschreibung der Krankheiten der Circulations- und Respirationsorgane, 1841; Krankheiten des Nervensystems in Virchow's "Handbuch der Pathologie"), who were firmly rooted in the system of natural history. After the earlier J. L. Casper (1796–1864), C. J. Lorinser (died 1853), the latter with an excellent book on the theory of diseases of the lungs (1823), Adolf Mühry (1810–1888) in Hanover (Darstellungen und Ansichten zur Vergleichung der Medicin in Frankreich, England und Deutschland, 1836) and the Berlin practitioner P. J. Philipp (Zur Diagnostik der Lungen- und Herzkrankheiten mittelst physicalischer Zeichen etc., 1836), with others, remained as it were mere skirmishers, they prepared the way for the French school of pathological anatomy and diagnosis, now coming forward in place of the school of natural history. An offshoot of the latter school in Germany, like the Dublin School in England, was the so-called

k. New Vienna School.[1]

which aided the French system to obtain complete domination in German medicine. The chief representatives of this school labored quietly, after the method of their model, while the preceding school was in its full glory, but without being able at first to obtain any extended influence. This was not accomplished until it had found in K. A. Wunderlich (1815–1877) of Sulz-on-the-Neckar, the panegyrist as well as critic of French medicine, an enthusiastic herald in Germany proper (1841).

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[1] G. Wolf, in his book "Zur Geschichte der Wiener Universität" (1883), says that this university stood for a century and a half under the influence of the Jesuits, and then for three quarters of a century, until 1848, was a mere training school for officials. Before the latter year the medical faculty alone rendered any service to genuine science.

A connexion between the new Vienna school and the old school of the 18th century, distinguished in its day for its soberness and its Hippocratic tendencies, is not directly demonstrable. At most it is manifest that certain common points of both remained, inasmuch as the active teachers of Vienna, with few exceptions, kept themselves tolerably free from the systems which flourished in the first third of our own century, and practised a comparatively simple old-Vienna therapeutics. This was the case with the famous clinician Joh. Val. von Hildebrandt (1763–1818), the successor of Dr. Nord (who taught after the departure of Frank from 1805 to 1811) and Joh. Nep. Edler von Raimann (died 1847; the son-in-law of Stifft), who was a professor in the university from 1812, succeeded Hildebrandt in 1818, and distinguished himself as well by clear, convincing views, as by his freedom from the abuse of venesection, so flourishing at that period, and in general by his expectant treatment (Handbuch der spec. med. Pathologie und Therapie, 5th edition, 1839). He was succeeded in the "Allgemeine Krankenhaus" by Güntner, who held the position until 1837. The same was the case with the already mentioned Ign. Rud. Bischoff von Altenstern at the "Josephsakademie" (Grundsätze zur Erkenntniss und Behandlung der Entzündungen und der Fieber, 2d edition, 1830), and with A. J. von Wawruch, but particularly with Dr. Schiffner, director of the "Allgemeine Krankenhaus" from 1837-1848, who represented in the twenties the traditional therapeutics of the old school. Pathological anatomy was at that time represented by Biermayer, whom, as he was addicted to drunkenness, Dr. Johann Wagner (died 1834), originally his assistant, succeeded in the professorship in 1829.

An assistant of the last-mentioned physician from 1829 was Karl, Baron von Rokitansky (born 1804, retired 1875, died July 23, 1878[1]) of Koniggrätz in Bohemia, one of the famous founders of a new school which at once extended its ideas over all Germany, and, indeed, exercised an influence upon all foreign countries, an influence particularly marked in Italy and Russia, and felt too, though less strongly, in England.

Rokitansky was the son of the Circle-Commissioner Prokop Rokitansky in Leitmeritz, who died in 1813 at the age of 42 years. By birth he was a Czech, and like Skoda, clung during his whole life with love to his race. In Leitmeritz and in Koniggrätz, where his mother settled after his father's death, Rokitansky enjoyed his primary and preparatory gymnasial instruction, after which he pursued in Prague the prescribed course of three years in philosophical studies, and undertook here and in Vienna the study of medicine. In the midst of financial straits he completed a three years' course in Prague, and one of two years in Vienna. On March 1, 1827, he passed in the latter city his first examination (Rigorosum) with the note "Satisfactory", and on Nov. 12th, his second with the remark "Good enough". Before becoming Wagner's assistant, Rokitansky was — from 1827 — assistant in the Museum of Pathological Anatomy of that day. In the first position he vainly solicited the professorship of anatomy in Klagenfurt, and two years later that of circle-physician in Hradisch. In 1831 he was appointed cholera physician in Galicia. After Wagner's death he occupied his chair for two years, and in 1834 was advanced to the position of extraordinary professor, uniting with this the office of judicial anatomist for the Residency of Vienna. On March 17th of the same year he began his lectures, "confining himself to special nosology; for upon this depends the fruitfulness of pathological anatomy". His assistants were J. Kolletschka (1803–1847; died of cadaveric poison), subsequently professor of forensic medicine and state-medicine in Vienna, and Schuh. From 1836 papers of Rokitansky, at the suggestion of the assistants last mentioned, appeared in the Austrian "Jahrbücher", and in 1841 his "Handbuch der pathologischen Anatomie" was published. The special (third) part, which contained the anatomy of the thoracic and abdominal organs, appeared first. In 1844 Rokitansky was appointed ordinary professor, and in this position published two years later the last or general part of his famous work, which has been often republished as well as translated. He also made use of microscopic anatomy, but only slightly. Rokitansky worked for a long time in a miserable place, until finally a magnificent anatomical building was erected for him. In 1866 he celebrated his thirty thousandth post mortem! Finally for fourteen years he occupied himself with the study of the defects of the septum cordis and the comparative anatomy of the urogenital organs. At a later period, from his character and his great general information — he was an enthusiastic admirer of Kant — Rokitansky was loaded with honors, introduced many improvements, and took his seat in the House of Deputies, an eminent champion of freedom of instruction. From his activity as a member of the Ministry of Instruction, however, he finally met with opposition on many sides with respect to his nominations to medical professorships. His sons: Procop von Rokitansky, professor in Innsbruck, is known for his researches on the cure of consumption; Carl von Rokitansky, a gynæcologist in Vienna, is devoted to the restoration of useful vaginæ (vaginoplasty). Two other sons are singers (Rokitansky's wife was a singer), and this fact Rokitansky embodied in the *bon mot* that two of his sons "howled" (heulten) and two "healed" (heilten).

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[1] Skoda, himself mortally ill, accompanied his coffin to the grave — this one man outweighing a whole glittering train of mourners!

Rokitansky transplanted in Vienna the pathologico-anatomical tendency of the school of Paris, whose researches and results he had already appropriated. Through the contrast which the soberness and positiveness of that school (qualities which Rokitansky had adopted in his works) formed with the luxuriant phantasies of the philosophy of nature heretofore flourishing in Germany, and the nosological efforts of natural history, he also aided the French school to secure the leadership, just as soon as attention was directed to his works.

If the contrast of the methods of the two schools won favor for the French system, still more were all captivated by the novelty of the subject, which, in spite of the ability of a Joh. Friedr. Meckel[1] (died in 1823), had remained up to this time unknown, so to speak, in Germany. To these recommendations were added the excellence and comprehensiveness of Rokitansky's study of the subject, and his exhaustive method.

The palpableness of the objects and results, which were interpreted as so many irrefragable scientific facts, now gave the preponderance to simple observation of the senses and to Realism. In this Rokitansky fulfilled for Germany, in the department of medicine, an historical task. It was he and Skoda who were destined to win for this department the Realism of the 19th century.

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[1] Rokitansky's first impulse was received from Meckel, together with Lobstein, Andral and others.

The demonstrated succession of the pathologico-anatomical changes, however, impressed the observer with the idea that an insight had been attained into the process, and particularly the process of development of the diseases themselves, though there lay before him merely the connecting external sequence of the products deposited during the continuance of this process. The dynamic side of morbid life, which withdraws itself from the knife, the microscope and chemical reagents, was now systematically overlooked, and mere anatomical facts were studied and recorded in their mode of origin and retrogression, although the clinical course of the disease was taken into consideration. This study of the finished product was undoubtedly begun with ingenuity and practised with great skill and consequent success at a period historically favorable thereto, and in addition to all this was carried out upon a magnificent scale. The founder of this system had the annual disposal of 1500–1800 bodies! From this latter circumstance it followed, as a matter of course, that pathological anatomy was utilized from the standpoint of statistics. From the frequency or infrequency of the association of certain diseases, their disposition to combination or exclusion was derived. Another point of view from which Rokitansky investigated and utilized the material of pathological anatomy was, as already pointed out, that of the study of the succession of established changes, and of the stadia of the formation of products, particularly in the inflammation of certain organs (hyperæmia, infiltration, increased plasticity, stasis etc.), in which he regarded the exudates thus arising as the essential characteristic of inflammation, and understood the process as one of new formation. In this conclusion the aid of microscopy and of chemistry was also called in. In the products discovered by the latter was at once seen the essence of morbid processes, and they were employed theoretically to establish a new humoral pathology, the so-called doctrine of crases (dyscrasiæ). This was an imitation, under a new name indeed, of the method of Andral and Gavarret. Immediately there arose a whole multitude of desirable crases, a hyperinotic and hypinotic, albuminous, croupous, puerperal, variolous, aphthous, and any others you please, all of which were employed in books and lectures, and upon which plans of treatment could be constructed at the bedside. According to Rokitansky, pyæmia, tuberculosis and the aphthous and croupous crases belong to the hyperinotic crases; typhus, acute tuberculosis, plethora, the exanthematous crasis, the cancerous dyscrasia, the crases in diseases of the nervous system etc. belong to the hypinotic crases. To these were added the "stases", which formed a shibboleth of equally facile employment. — Rokitansky, however, speedily and silently abandoned this doctrine and returned to his earlier mode of thought and investigation, which was exempt from speculation; for the enthusiastic reception of this theory of his warned him of the danger of such theories to others who were less capable of reflection than himself.

Rokitansky was at all events the chief of the new Vienna school, and its Van Swieten in his influence upon Austrian medical educational affairs, though the latter at last occasioned him numerous opponents. He was a master of spoken, as well as written language, and in speaking possessed the gift of humor. — His works are distinguished by the simplicity, clearness and plasticity of their statements, and his restoration of pathologico-anatomical observation must be regarded as a model of scientific labor.

On interstitial pneumonia, a morbid process brought forward by Rokitansky, he writes as follows: "So far as individual, rare observations extend, the tissue in the interstices of the pulmonary lobules, and between the smaller groups of pulmonary cells, at the outset, when too much dark pulmonary tissue is not present, appears of a pale reddish hue, and swollen with an albuminous infiltration. The pulmonary vesicles are either pale, and according to the degree of swelling more or less compressed, or if they participate in the inflammation they are reddened and occasionally granulated, though always very finely granulated only. In process of time the infiltration of the interstitial tissue becomes organized and blended with the latter into a dense, fibro-cellular substance, in which the pulmonary vesicles, as the result of the compression, are obliterated and finally disappear, changed into a homogeneous cellular tissue. We then find whitish, dense bands, often creaking under the knife, or shapeless masses of the same structure interwoven with the substance of the lung. In some cases this form of pneumonia may result in a suppuration, which as it were dissects and separates the lobules. This pneumonia, when chronic, creeps from one lobule to another, and the apices of the upper lobes are its ordinary seat. The devastated portions of the lungs sink in, dragging after them the surrounding parenchyma in the form of cicatricial folds and widening the neighboring bronchial tubes. Frequently this cicatricial tissue contains a considerable quantity of pigment."

Historically too the following expressions of Rokitansky (the earliest representative of Realism in Germany), spoken on retiring from his professor's chair July 16, 1875, are extremely remarkable, especially as they come from one of the most prominent founders of the realistic tendency of our century. "We are borne along by a great common stream, into which flow many pure, peaceful and clear rivulets. . . . . In accordance with the pressing needs of my time, I have won for pathological anatomy in the department of German science such importance, that I may designate this as a basis for a science of pathological physiology, and as a foundation for scientific investigation in the sphere of medicine. . . . . Individualism begets a disease; it is over-appreciation of self, which manifests itself in vanity. . . . Gentlemen, I do not hesitate to say that we stand upon the threshold of a form of degeneration, the so-called modern Individualism. This, in co-operation with a realistic conception of the individual, biased in its very foundations, is to degenerate into a cultus of the latter" etc.

A proof of his Kantian mode of philosophizing may be taken from his address "On the independent value of knowledge", in which he says: "that from the disproportion of the human organs to the external world, e. g. that of the eye or the small retinal pictures to space, correct ideas are always unattainable for us, and accordingly things must possess an inmost, invisible essence, lying beyond all experience, of which we know nothing." (The very idea of Kant).

Rokitansky did not occupy himself with microscopy, and still less with the subjects of practical medicine. Like Cruveilhier in the French school of pathological anatomy, he was a pure pathological anatomist. His influence upon practice, therefore, was indirect only, inasmuch as his investigations resulted in the fact that from this period forward pathologico-anatomical pathology and local therapeutics were taught and practised in Germany, though Rokitansky himself did not exercise, nor even strive to exercise, any dominant influence therein. Such, however, was not the case with the physician to be next mentioned.

If Rokitansky deviated in no main point from the views of the chief pathological anatomists of France, the same was not the case in essential respects as regards physical diagnosis with the second great man of the new Vienna school,

Joseph Skoda (born Dec. 10, 1805, died June 13, 1881) of Pilsen, who introduced a genuine reform in the interpretation and conception of physico-diagnostic phenomena by adapting them to physical laws — the laws of sound.

Skoda, like Rokitansky, of Czech descent, and the son of a locksmith, amid great privations and by constantly giving private lessons, completed his gymnasial and philosophical preparatory studies in his native city, and at the age of twenty years went to Vienna as a student of medicine. After a sojourn of six years in the university of Vienna he became a doctor of medicine, and as his means were small, accepted the position of cholera physician in Bohemia in 1831, as Rokitansky had done in Galicia. In 1833 and for five years thereafter he was second physician to the "Allgemeine Krankenhaus". In 1839, having published three years before a treatise on percussion, and shortly before, in conjunction with Kolletschka, another on pericarditis, he issued his famous work entitled "Abhandlung über Percussion und Auscultation", now in its sixth edition.[1] As he annoyed his patients, he was assigned to the section occupied by the insane, but after he had been for nine months district physician to the poor in St. Ulrich, he obtained in 1840 the position of prescribing physician to a special section of the "Allgemeine Krankenhaus", assigned, in imitation of Paris, to diseases of the chest as a "Specialty". The next year Skoda became a physician of the first class, and received in addition the sections for diseases of the skin and for internal diseases. It was not until 1847 that, on a recommendation from Prague, he was appointed professor in the clinic for internal diseases. Here he was the first professor to lecture in German. In spite of his bachelor peculiarities,[2] his taciturnity and his heedlessness, he was a very popular physician, and, in contrast with Rokitansky who died poor, Skoda left to his brother Franz a fortune of two millions of marks, bequeathed 200,000 marks for scientific and medical objects, and remembered his servants generously. Two years after his death the street in which he had resided was honored by the magistracy with the title of "Skodagasse", and a tablet was placed upon his dwelling. When retiring from his position as an active teacher he said: "Now the microscope and chemistry may take their turn!" Nobility, so easily obtained in Austria, he scorned. Besides his chief work, the labors of Skoda, like those of Rokitansky, were not very extensive. He wrote, however, on the impulse and sounds of the heart, on examination of the abdomen etc.

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[1] Edited by Prof. Dr. Gustav Löbel (1817-1880) of Nowarow in Bohemia, for many years Skoda's assistant and a popular practitioner of Vienna, though he himself always avoided practice.

[2] For the benefit of his tailor, who had befriended him during his student life, he wore "barn-door" breeches until the day of his death, although he might have aided him in an easier way; and yet he even sued a minister on one occasion to obtain his honorarium.

To a still greater degree than Rokitansky, in whom there dwelt a certain amount of artistic warmth and enthusiasm, in spite of the purely realistic subject upon which he labored, the "utterly unimaginative" Skoda influenced the realistic tendency which German medicine was destined to take. For he it was without doubt, who by his physical and experimental system was the author of that method which we are in the habit of calling à la Française the exact or objective method, and which regards the patient as a purely scientific or physical problem, and especially as an object of exact diagnosis. In this method the curative aim of medicine steps into the background; indeed, this aim, as we know, became for a long time an almost absolutely mythical idea, and as at an earlier period in France finesses in diagnosis, so in Germany now merely nominal physical explanations often formed the reputation of a clinician, as of a physician who occupied the very summit of knowledge of his age, while the pretension to therapeutical service, for the sake of which the physician is a physician, became almost a subject of derision.

The scientific merit of Skoda is based upon the fact that he overturned the specific and pathognomonic arrangement of sounds made by the French school, e. g. gastric sound, thigh sound, cavernous respiration etc., and substituted categories of sonorous phenomena based upon the physical constitution and configuration of the organs and tissues; and further that he tried to develop the purely empirical French doctrine of physical signs into a strictly scientific system of physics. The latter object, however, he did not completely attain, as he relied too much upon individual would-be acoustic, but really merely empirical principles, as e. g. in his terms "tympanitic" and "non-tympanitic". Great credit is also due to him for his elucidation of the phenomena of cardiac diseases.

Skoda made his famous physical scale the chief basis of percussion, and arranged sounds into the well-known and much-disputed classes: 1. From full to empty; 2. From clear to dull; 3. From tympanitic to non-tympanitic; 4. From high to deep. He likewise brought auscultatory phenomena under the laws of acoustics, both those relating to the voice and the other auditory phenomena observed in the chest. The respiratory sounds he divided into vesicular, indeterminate and bronchial. As Skoda, however, found acoustics in a very rudimentary condition, he created a system of his own, by means of which he, according to our present knowledge, was able to interpret acoustic phenomena rather medico-physically than strictly physically. Moreover he always went to work upon an experimental basis, studying particularly upon the cadaver the legitimate conditions of the diagnostic acoustic phenomena, so as to employ these as the basis for judging of the physical variations from the norm in the sick. This must be regarded as a great excellence, when we compare his method with that of other experimenters who experimented with all sorts of heterogeneous things.

Skoda's style is also peculiar. Contrasted with the artistic style of

Rokitansky, it is succinct, indeed, often harsh and dry, so that it is no easy task to master his book. Matters of fact in particular are as dryly stated as they are clumsily incorporated.

The preface to the fifth edition of his famous work may serve as an example of Skoda's style. "This edition is not essentially different from the earlier ones. The chapter on the sound of percussion is enlarged by the introduction of the views of Dr. Hans Locher and Dr. Mazonn. The papers of Dr. Hoppe 'On the theory of Percussion' and theoretical considerations on the so-called consonant auscultatory phenomena, especially bronchophony, did not reach me until the printing of the corresponding chapter was completed. The chapter on the impulse of the heart is thoroughly revised, and the diagnosis of adhesion of the pericardium to the heart is given in accordance with the paper contained in the Reports of the "Imperial Academy of Sciences" for Nov. 1851. The views of Rapp, Kiwisch, Baumgarten, Hamernjk, Nega and Wachsmuth on the origin of the sounds of the heart have not changed my ideas upon this subject." The preface shows too how very carefully Skoda always considered the views of others, without, however, reposing upon the laurel of "authority". This is a peculiarity of Skoda's, quite as conspicuous as the quiet criticism which confutes an opponent entirely by the contrast which his own soberness forms with the method of his adversaries, and in which not infrequently there lies a characteristic irony: e. g. "While I am of the opinion that it is not worth the trouble to criticise the physical ideas contained in the above quotation" etc. Piorry and Briançon had, as we know, laid down a "Son hydatique". Skoda says: "I do not know whether anyone besides Piorry and Briançon has had such experience. Experiment with the stomach, however, proves that hydatids are not necessary to the production of the hydatid tone". "Since Hans Locher does not specify my offences against logic and acoustics, and I myself have not discovered them, I simply remark" etc. "In conclusion I must quote a passage from which it is very evident that Dr. Hans Locher has not read my treatise on percussion and auscultation with special attention". Moreover Skoda was a complete master of the literature of physical diagnosis, without, however (like those who plume themselves particularly upon this familiarity), becoming pedantic in his treatment of the subject.

Skoda, by his views on physical diagnosis, showed himself an independent spirit, who received, indeed, his impulse from France, but yet far outstripped and overtopped scientifically the French diagnosticians. It should be further emphasized that Skoda was the first in Germany to assist Auenbrugger, the diagnostician of the time of the Old Vienna School, in securing a merited recognition. As already remarked, he was the first for whom was created in Vienna, after the French model, a "specialty", that is a special division for patients suffering from thoracic diseases. In this he was followed by Hebra and others with other specialties. Thus was laid in Germany the foundation for the dismemberment of clinical and practical medicine, with whatsoever of advantage science has drawn from the system of specialties through more assiduous, as well as more minute cultivation.

On the other hand, practical medicine, in the hands of Skoda (and chiefly through his influence, first in Vienna, and thence throughout almost all Germany until far into the fifties) degenerated into simple diagnosis. By his observations on the "natural course of disease undisturbed by therapeutics" he became the direct and proper founder of purely expectant or nihilistic therapeutics in Germany, and the author of a cheerless period in clinical practice, to which are well adapted the words of Alphonse Karr: "Tout ce que les médecins ont fait pour guérir le rhume de cerveau c'a été de l'appeler coryza". During this period, instead of conceding (as would have been just) that practical medicine can lay claim to only a *slight* active influence, it finally became an obligatory rule of faith to plead for the *complete* impossibility of any medical influence upon diseases — and to manage at the bedside accordingly. Hence it resulted that university professors and clinicians, followers of Skoda, were able to make extremely nice, so-called exact diagnoses, by the assistance of percussion etc., but could no longer teach how to write a prescription, though they had for pupils future practising physicians alone, who accordingly from the outset must regard themselves as mere superfluities or impostors.

A necrologist said of Skoda: "Skoda was through and through a medical savant and investigator. For him man was an object of investigation (sic). He could be candid even to the point of recklessness. Accordingly the patient had the consolation (?) of standing in the presence of a man who gazed, as with the eye of clairvoyance, into the very vitals of the sufferers, and explored the seat of disease". Skoda's system had, however, the advantage of casting injudicious medication and over-medication into the background and replacing it by knowledge, and of teaching that the conditions of health and convalescence for the most part lay in other directions than the swallowing of drugs. "Air, water, cleanliness and temperance are the best pills" said Skoda. "And the drug-store?" "Well, perhaps there is *some* good in this too!" At a consultation where he was asked about the medicine to be prescribed, he replied: "Oh! that is immaterial!" (Ach, das ist ja alles eins!).

If it was a peculiarity of the two great men of the new system already mentioned that each of them wrote substantially only a single work of controlling influence, and this upon his own special branch, the proper practitioner and clinician of the new Vienna school is characterized by the fact that he wrote no extensive work at all. This may have been the sole reason why his activity as a teacher of so very large a number of pupils and as a practitioner was so intense — like that of Schönlein, whom he followed in this respect, though he lacked his therapeutic fertility. For teachers who are fertile authors seek reputation rather in writing than in teaching, in the number of their pupils and in practice.

JOHANNES VON OPPOLZER (1808–1871) of Gratzen in Bohemia, was from 1841 professor of clinical medicine in Prague, where he had completed his entire education from the gymnasium up. After the completion of his studies, he was for a long time assistant in the clinic of the professor of surgery, Fritz, and of the professor of medicine Vincenz Julius Krombholz (1783–1844). After a residence of seven years in Prague, Oppolzer received a call to Leipsic and was one of the first to introduce the new system into Germany. After two years, however, he returned to Austria, and in fact to Vienna. Here he founded in 1861 the "Verein zur Pflege erkrankter Studirender", which in 1886, after an existence of 20 years, had at its disposal an annual income of 100,000 marks — Oppolzer wrote but little. His "Vorlesungen über specielle Pathologie und Therapie" were edited, however, and published by Dr. Emil Ritter von Stoffella from the year 1866 onward. — A much more fertile author in his department is Oppolzer's son Theodore (born 1841). Doctor of Medicine, a popular astronomical writer and professor of astronomy in Vienna.

If Oppolzer wrote no independent works adapted to direct the tendencies of the school to which he belonged, on the other hand, he supplied to the latter probably the most substantial aid by proving in his time its clinical and practical usefulness by his own labors. This perhaps, was the more readily accomplished because Oppolzer, from all accounts, possessed in an eminent degree the characteristics of the born physician and practitioner. By means of this gift he popularized physical and anatomical local diagnosis, as well as local therapeutics, at the sickbed of daily life. without himself opening any new therapeutic paths which might have sustained him in his task. He was particularly admired for his "objective" "snap-diagnoses" (Schnelldiagnosen). What difficulties at first lay in the way of the introduction of physical diagnosis may be judged from the fact that, as late as 1845, Krüger-Hansen still argued against the method. that a lady would hesitate to expose her bosom to any youthful Æsculapius, who probably did not bear the best reputation, and that he only who suffered from impaired hearing could regard the stethoscope as particularly necessary, while, on the other hand, deaf physicians, who were still practising, could not use the instrument at all. Such objections continued to be presented as late even as the beginning of the fifties. In return, the method was also undoubtedly cultivated so one-sidedly that Hippocratic diagnosis was almost entirely thrust aside and remained in the background even down to the present day. That the popularization of physical aids in the labors of the physician is, however, an actual, practical gain, though not such an immeasurable advantage as was fondly imagined in the time of the greatest enthusiasm for the new method, has been thoroughly demonstrated. And the merit of having accomplished this popularization belongs in an essential degree to Oppolzer. He likewise began to restore therapeutics to its rights, and thus became the father of the "Young-Vienna School", the chief organs of which are the "Wiener medic. Presse" and "Die medic. Rundschau", under the control of Prof. Joh. Schnitzler (born 1835), of Groszkamsza, and K. Bettelheim. The clinical institution of the latter physicians has become the general policlinic. Oppolzer was succeeded in 1872 by Heinrich von Bamberger (1822–1888; Lehrbuch der Krankheiten des Herzens, 1857; Die Krankheiten des chylopoetischen Systems), who was succeeded in turn by Hermann Nothnagel. Bamberger was a pupil, and for a long time an assistant of Oppolzer, and then a professor in Würzburg, whence he was called to Vienna.

Along with Oppolzer, Ferdinand Ritter von Hebra (1816–1880), of Brünn in Moravia, was an important agent in opening new and permanent routes in practice, or rather in the therapeutics of the diseases of the skin, a branch of science in which he worked a complete revolution.

Hebra was as independent an investigator as a physician, and his services in the treatment of the sick are unquestionably the greatest which the Vienna school or any of its members has rendered to medicine, though it was he again who supplied notable support to the nihilism of the Vienna or Skodaic system of therapeutics. For, in opposition to all precedents, he acted with a positiveness almost reckless, a course, however, which he could justly pursue in his specialty in opposition to the numerous absurdities of an earlier age, and one which he was likewise able to follow out with great success.

Hebra studied in Vienna and graduated there in 1841. He was then appointed assistant to Skoda, and received charge of the division for patients suffering with the itch. In 1842, having previously held very popular courses of private instruction, he obtained permission to lecture. There was then created for him a special section for diseases of the skin, over which he presided as professor from the year 1849. His clinic became one of the most popular in the University, a result due not only to the novelty of his views, but also to his style of lecturing, which was quite free from the *ex cathedra* tone and was mingled with humor, occasionally of a caustic nature. His chief works are the "Acute Exantheme und Hautkrankheiten", forming the 3d volume of Virchow's "Pathologie" (now appearing in its 2d edition); the "Atlas der Hautkrankheiten", from original cases by Prof. von Bärensprung in Berlin and Prof. Hebra in Vienna. Text by Prof. Hebra. (1867); "Aufsätze über Krätze", 1842; Herpes tonsurans, norwegische Krätze etc. — Hebra's chief work is distinguished by the fact that in it alone, among the works of the new Vienna school, some attention is also paid to the history of individual diseases of the skin. — Hebra educated numerous pupils most of whom, however, for a long time left literary reputation to him alone. Recently, however, the professors, Dr. Isidor Neumann (Lehrbuch der Hautkrankheiten, 2d edition, 1875, with wood-cuts after excellent drawings by Dr. C. Heitzmann, now in New York), and Dr. Heinrich Auspitz (1835-1886), Director of the Policlinic, who recently published a "System der Hautkrankheiten" differing from that of Hebra, have distinguished themselves as authors. Hebra's most eminent pupil, however, is Prof. Moritz Kaposi (properly Kohn), his son-in-law, and an associate in the preparation of his chief work. Other pupils are Gustav Wertheim, Pick in Prague and Lang in Innsbruck.

Hebra divided diseases of the skin according to the following artificial system (1845):

1. Diseases occasioned by congestion of the skin; Hyperæmiæ cutaneæ. 2. Diseases due to anæmia of the skin; Anæmiæ cutaneæ. 3. Diseases due to morbid secretion of the cutaneous glands; Anomaliæ secretionum glandularum cutanearum. 4. Lesions due to the products of inflammation and to exudations; Exudationes. 5. Lesions due to transudations of blood: Hæmorrhagiæ cutaneæ. 6. Diseases of the skin originating in an increase of its mass; Hypertrophiæ. 7. Lesions of the skin due to a decrease in its mass; Atrophiæ. 8. Diseases occasioned by benign new formations; Neoplasmata. 9. Diseases of the skin originating in malignant new formations; Pseudoplasmata. 10. Ulcerations of the skin; Ulcerationes. 11. Nervous diseases of the skin; (Anæsthesiæ and Hyperæsthesiæ) Neuroses. 12. Animal and vegetable parasites of the skin; Parasitæ.

Hebra, as we see, selected pathological anatomy as the foundation of his system. — Eczema is regarded as the most frequent kind of skin-disease, and its fundamental forms are papules and vesicles. He considers this, as well as the great majority of all diseases of the skin, a local lesion. Yet, in spite of his principle of regarding diseases of the skin as local troubles, Hebra does not one-sidedly entirely exclude a constitutional foundation for them. In this emphasis laid upon the local nature of many diseases of the skin, particularly those of a non-febrile nature, lies, however, a chief characteristic of Hebra, inasmuch as he combined therewith the principle (here frequently correct) of simple local treatment, as distinguished from the general treatment of skin diseases which had existed almost exclusively before his day. In connexion with this simple local treatment, attention was paid to the nature of the case, and thus undoubtedly many successes, though not always radical ones, were attained. In this way Hebra became the author of many excellent methods of treatment. On the other hand, as a pupil of Skoda, he was among the champions of the nihilistic therapeutics of the Vienna school, influential chiefly in his own specialty, but also secondarily upon the whole science of therapeutics. Like Skoda too, he instituted numerous observations in which a mere pretence of treatment was pursued, by which it was established that many lesions get well of themselves, a conclusion which had been taught, even as regards diseases of the skin, by the most important and the better physicians of an earlier day, though without experimental proof. — Another of Hebra's merits was his acceptance of the itch-mite as the cause of the itch, a doctrine in which he unreservedly followed Wichmann. His teaching that the eruptions of the itch are, for the most part, scabious eruptions is not so well established. On the other hand, Hebra's doctrine of the so-called recession of eruptions, to the effect that the disappearance of external eruptions is due to their jugulation by some internal disease, but not that the latter is the result of this disappearance, has been proven by experience. In syphilis Hebra again called in the aid of that almost interdicted drug, mercury, a course in which he was followed by the most famous syphilographer of the new Vienna school,

CARL LUDWIG SIGMUND, Ritter von Ilanor (1810–1883, died in Padua) of Schässburg in Transylvania, author of the "Einreibungscur bei der Syphilis" (1856).

Sigmund, the son of a minister, is also of interest in an historical point of view as the first Protestant professor of modern times (since 1849) in Austria, a result to which the successful treatment of the social disease in the highest circles probably contributed more than religious toleration. He won a reputation as one of the first champions of international hygiene (in the plague, cholera etc.) and (like Ricord) as a sprightly writer on bathing resorts in his book of travels.

Syphilis he classified (a classification likely to occasion more embarrassment in its application to the diagnosis and immediate treatment of any given case, than the precise division itself) into: 1. A gonorrhœal group, or specific, contagious, local, venereal catarrh; 2. Group of contagious, venereal ulcers, without resulting general contagion. Both these classes are purely local troubles, and therefore to be also treated locally.

3. Group of infectious, syphilitic forms of disease, to be treated with mercury after the accomplishment of infection. 4. Pseudosyphilis.

Joh. von Waller (1811–1880) in Prague

made himself well-known as a experimental syphilographer. He was one of the first to inoculate syphilitic pus upon the healthy for prophylactic purposes — certainly a bad beginning.

Jos. Hermann,

another syphilographer of Vienna, is a fanatical opponent[1] of the mercurial treatment (Die Behandlung der Syphilis ohne Merkur, 2d edition, Vienna, 1857, and other works). He desired even to have the use of mercury prohibited by law.

Fr. W. Lorinser

was likewise an anti-mercurialist. Another Viennese,

Albert Julius Carl Michaelis,

in his compendium of the theory of syphilis advocated a more eclectic treatment.

Hermann Zeissl (1817–1884; Lehrbuch and Compendium der Syphilis)

shows himself in his works a gifted and thorough investigator of the theory and literature of syphilis.

Joh. Karl Proksch (born 1839) in Vienna,

an anti-mercurialist in therapeutics, is the author of numerous bitter critiques.

The nihilistic tendency in therapeutics was carried to excess by

Jos. Hamernjk, professor in Prague,

then a practising physician in that city and a frequent and active cultivator of the subject of physical diagnosis (Carditis als Ursache von Klappeninsufficienz, 1843; physiological and pathological investigations on the mechanism by which the venous and arterial valves of the heart are closed, and by which the sounds of the heart are produced, and similar researches on the appearances in the arteries and veins etc., 1847; Das Herz und seine Bewegung, 1858; Grundzüge der Physiologie und Pathologie des Herzbeutels, 1864, etc.). He based his nihilism upon the maxim, that, as we have no precise knowledge concerning the advantages of drugs, and especially on those of bloodletting, we should follow the rule of doing no harm by unsafe treatment. The opposition of Hamernjk and Dietl to bloodletting recalls that of the followers of Erasistratus — all an old story!

Anton Jaksch, Ritter von Wartenhorst (born 1810), professor in Prague, and Joseph von Halla (1816–1887) a clinician of the same place and a pupil of Skoda and Rokitansky, also belonged to this school. Its most extreme representative, however, must undoubtedly be considered

Jos. Dietl (1804–1878), of Podbuj in Galicia,

who graduated in 1829, was from 1833 assistant to the chair of mineralogy and zoology in Vienna, became in 1841 "Primararzt" to the Wiedener Hospital, was from 1848 to 1851 its Director, then a professor in Cracow and burgomaster of the same place until 1874, and from 1869 a member of the "Herrenhaus". He wrote in favor of absolute inactivity, trust in God, particularly in diseases of the lungs ("Der Aderlass in der Lungenentzündung. Klinisch und physiologisch bearbeitet", Vienna, 1848; "Anatomische Klinik (!) der Gehirnkrankheiten", 1846), and supported his words by statistics (of 750 cases of pneumonia treated without bleeding, 69, about 10 per cent, died, and these from complications). This doctrine in its day aroused a genuine storm of *pros* and *cons*, made its author the most talked about member of his school, and won for him in the future the importance of an exponent of its teachings. In particular Dietl taught as regards venesection that it was never indicated in pneumonia, and, indeed, was only injurious, a statement which in its doctrinaire exclusiveness could not claim general acceptance. According to him, it worked injury "because it favors the formation and extension of the hepatization, purulent softening and the exhaustion of the patient, increases the blood-crasis, conduces to the formation of fibrinous coagulations in the heart and great vessels, and the simultaneous origin of other exudative processes, and thus increases the mortality", a doctrine, which, sober as it sounds, was yet entirely theoretical. — Dietl was a most fanatical panegyrist of learning and scorner of the treatment of modern times. "By the sum of his knowledge must the physician be judged; in the physician we should prize the naturalist, not the empiric and his success. As long as there are lucky physicians, so long there are no scientific physicians . . . . but the patient will avoid the scientific physician. Of course the scientific physician lays no weight upon the treatment; in science alone he seeks his power. Nature only can cure. To this maxim we must cling then, when we have discovered a principle of treatment subordinate to the same", a sophistical, sublimated skepticism, so exaggerated that fortunately every hour of practice shows its absurdity.

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[1] The antagonism between the mercurialists and anti-mercurialists was moderated by the introduction of the preparations of iodine by William Wallace, a physician of Dublin, in 1835.

The nihilistic doctrines of the followers of the Vienna school, the further they spread from their place of origin, the more they increased in acceptance and reputation. Indeed, so far was this the case, that for a long time here and there in the empire the question as to the treatment of any given disease was met with an incredulous or ironical shrug of the shoulders, or with the standing prescription: "R. — A little bitter-almond water mixed with considerable common water, sweetened and fortified with syrup". Yet these doctrines had, doubtless, the advantage, which always attaches to skepticism as such — they opened the way for the truth. But the one-sidedness and recklessness with which the whole past of medicine was opposed, and which now denied to that past, as it were, all therapeutic service, as the French school had already denied to it almost all pathological and diagnostic knowledge, can be in no way supported, and could in the long run prove nothing but injurious. From this sprang manifestly the almost absolute neglect by the new Vienna school (Hebra perhaps excepted) of all historical study of the individual branches, as well as of medicine in general. For this school, in contrast to those of the philosophy of nature, of natural history and even of homœopathy, is peculiarly characterized by the fact that it has produced no independent historical work, but in this department allows itself to be represented by a homœopath. Thus it happened that (granting even the propriety of doubts in the successful action of drugs) the old Hippocratic science of hygiene, which had been also cultivated by the *old* Vienna school, received no aid of the slightest importance from the *new*. We say nothing of the neglect of the humane side of the medical profession, which certainly in the so-called "exact, objective, unimaginative, experimental, scientific" and now exclusively dominating hospital practice, whose influence (in contrast to that of private practice) through the new school now occupies the foreground, as it did at an earlier period in France — this humane side, I say, could not and did not readily find any considerable promotion and cultivation.

In spite of the incredulity which prevailed in this school with respect to the treatment of disease by drugs, an incredulity originating in the French school and due partly also to the ill success of all medication as demonstrated in the time of the cholera, there yet sprung from its fold a famous pharmacologist,

KARL DAMIAN, Ritter von Schroff (born 1802) of Kratzau in Bohemia, a country from which the most numerous, and most important physicians of the new Vienna school took their origin.

Schroff studied in Graz until 1825, when he went to Prague and, like Oppolzer, became the assistant of Krombholz. For a long time he also managed here the insane asylum, and then an institution for the deaf and dumb. In 1830 Schroff went to Olmutz as a professor, officiated here, like the original founder of the new Vienna school, as cholera physician in 1832, removed to Vienna in 1835 to assume the position of a professor, and from this place in the following year made scientific tours to the chief countries of Europe. It was not until 1849 that he received the chair of pharmacology and a pharmacological laboratory. His chief works are: "Lehrbuch der Pharmakognosie", 1853; "Lehrbuch der Pharmakologie", 1856.

Schroff proved numerous drugs, particularly the poisons proper or alkaloids. Like Wepfer, Harder and Brunner in the 17th century, he investigated experimentally the action of drugs, or their most active constituents, upon animals, and, as William Alexander and Hahnemann had done at an earlier period, upon healthy men also. Besides Schroff Sr., professor Wenzel Bernatzik (Handbuch der allgem. und spec. Arzneiverordnungslehre, 1876) and Dr. C. von Schroff Jr., who in 1876 succeeded Clar in Graz, should be noticed as pharmacologists.

An opponent of all theoretic tendencies, and especially of the humoral doctrine of crases, appeared within the school itself in the person of

JOS ENGEL (born 1816) of Vienna, who originally, like R. Gruby, Franz Ragsky (died 1875), Florian Heller (1813-1871) and others, had been a follower of this school.

Engel studied in Vienna, and after his graduation in 1839 became an assistant to his teacher Rokitansky and conducted a course of lectures on pathological histology. From Zürich (where in 1844 he relieved Henle and his earlier assistant Kolliker of Zürich) and Prague (where in 1849 he taught pathological anatomy in the university) he returned in 1854 to Vienna and took a position in the Josephinum, in which until its closure two years ago (1874), he taught pathological and topographical anatomy. Engel is a very fruitful writer. His chief works are: "Entwicklung einer patholog.-anatom. Propädeutik", 1845; "Das Knochengerüste des menschlichen Antlitzes", 1850; Untersuchungen über Schädelformen", 1851; "Darstellungen der Leichenerscheinungen und deren Bedeutung", 1855; "Specielle pathologische Anatomie", 1856; "Compendium der topographischen Anatomie", 1860, etc.

Engel ever strove to render pathological anatomy a practical science, and is one of the most important of Rokitansky's pupils.

The following physicians should also be mentioned among the pathological anatomists of reputation: Th. Helm, as early as 1848–1851 provisory Director of the General Hospital at Vienna, and permanent Director of the same institution from 1855 to 1869, where he succeeded Haindl (1851–1855), and was himself succeeded by J. Hofmann. Helm wrote a "Monographie der Puerperalkrankheiten", 1840. A. Biesiadecki, professor in Cracow and subsequently Protomedicus in Lemberg (Beiträge zur physiol. und pathol. Anatomie der Haut; Ueber Tuberkelbildung in Blutkoagulis; Untersuchungen aus dem pathol.-anat. Institut in Krakau, 1872); Jul. Max Klob, now professor in the "Rudolfsspitale" (Pathol. Anatomie der weiblichen Sexualorgane, 1864; Pathol.-anat. Studien über das Wesen des Choleraprocesses, 1867, etc.); J. Dlauhy, professor of pathological anatomy in Prague; Th. Wislocki (Compendium der patholog. Anatomie, 1853); Rich. Heschl (1824–1881), Rokitansky's successor in Vienna in 1875 (Compendium der allgemeinen und speciellen pathologischen Anatomie, 1854, etc.). The latter physician rendered good service to craniology and pathological histology, and established the first collection of specimens in the latter department founded in Vienna.

If the number of Rokitansky's pupils and disciples who emulated and followed their teacher in the scientific and literary departments is relatively small, the reverse was the case with respect to Skoda. No doctrine in recent days has found so many devotees as that of physical diagnosis. Thus many amplifications of Skoda's original doctrines, and some adaptations of the same to a more refined acoustics, have been introduced, but the principles had been given by the master, once for all and unchangeable. Useful, for the most part, as were such labors *per se*, they have yet been partly and in spite of themselves very prejudicial to private practice by the one-sided interest in a special tendency which they continually aroused and kept awake, a tendency to which, as we have seen, Skoda gave the impulse. For they diverted the acumen and reflection of physicians from therapeutics more than had been done already by Skoda, and they promoted the belief that the most capable practical physician was he who made the most "exact" diagnoses. If the maxim of Baglivi (often appealed to with some justice), that he treats well who diagnosticates well, is true as a whole, yet its application appears at once false when, in behalf of the diagnosis, the second requisite of the physician is either forgotten or neglected. This, as we know, was long the case in private practice everywhere. Here the doctrines of general therapeutics especially, the most useful and effective of all, continue to be laid aside almost entirely, and this to a degree such as has scarcely ever been the case in any period of the past history of German medicine. In the demonstration of local changes too, the patient and the fundamental principles of treatment relating to the entire organism and etiology in its widest sense, principles which must be the main object to the practical physician in presence of his patient, were neglected almost more than in the French school, the mother of this system.

No medical specialty in Germany since the beginning of the Vienna school could point to so many clever works (besides numerous translations) based in part upon ingenious experiments, as that of physical diagnosis, particularly the diagnosis of thoracic diseases. Many of these experiments, however, were not at all applicable to the relations of the body, yet they prove in themselves that professional thought gravitated for a very long period to diagnosis. Besides the chief work of Skoda already mentioned and that of L. A. Siebert (1805–1855), professor in Jena, we must content ourselves with mentioning only a few works and writers, who either incidentally, or in treatises and special works, discussed or enriched physical diagnosis, and who either proceeded directly from the Vienna school or were connected with it. Ed. Mayer, "Die Percussion des Unterleibes", 1839; Franz Zehetmayer, subsequently professor in Lemberg, "Grundzüge der Percussion und Auscultation in ihrer Anwendung auf die Diagnostik der Brustfell- und Lungenkrankheiten, als Leitfaden zum Selbstunterricht für Aerzte dargestellt", 1842; C. D. Leichsenring, "Die physikal. Exploration der Brusthohle", 1843, 2d edition 1853; 3d edition by Joh. Oppolzer 1854; by the same author "Die Herzkrankheiten. Leitfaden zum Selbstunterricht für Aerzte", 1845; Moritz Korner (1820–1876) of Kratzau in Bohemia, professor of special pathology and therapeutics in Graz, discussed special branches of physical diagnosis in some journal articles; C. Canstatt, who wrote on the practical advantages of physical examination of the thoracic organs (in Latin), 1844; Eugen Kolisko (1811–1884), Primarzt, "Ueber amphorischen Wiederhall und Metallklang in der Brusthohle", österr. Jahrb., 1844, etc.; Gustav von Gaal, "Physikal. Diagnostik und deren Anwendung in der Medicin, Chirurgie, Oculistik, Otiatrik und Geburtshilfe, enthaltend etc., nebst Anhang über die mikroscopisch-chemisch-pathologische Untersuchung von Dr. Joh. Flor. Heller", 2d edition, 1849; Dr. Georg Weber, practitioner in Kiel, "Theorie und Methodik der physikalischen Untersuchungsmethode bei den Krankheiten der Athmungs- und Kreislaufsorgane", 1849; "Percussion und Auscultation des Herzens im gesunden und krankhaften Zustande, nebst tabell. Uebersicht der Herz- und Lungenleiden, in diagnostischer und pathologisch-anatomischer Beziehung nach Skoda und Rokitansky, mit einem Anhange über die Behandlung derselben, bearbeitet von Dr. Liberal Günsburg", 1845; F. H. Mühlbauer "Die Lehre von der Percussion und Auscultation, mit Berücksichtigung der pathol. Anatomie der Brustorgane für den praktischen Arzt zusammengestellt", 1847; Rapp, "Beitrage zur Diagnostik", 1849; J. Fr. Conradi, now practising at Wöllstein in Rheinhesse, "Ueber die Lage und Grösse der Brustorgane, der Leber und Milz beim gesunden Manne und ihre Bestimmung durch die Percussion, præs. Jul. Vogel in Giessen", 1848; Dr. J. F. H. Albers (1806-1867) professor in Bonn, "Die Erkenntniss der Krankheiten der Brustorgane aus physikalischen Zeichen, oder Auscultation, Percussion und Spirometrie. Nach Herbert Davies' Vorlesungen und eigenen Beobachtungen bearbeitet", 1850; J. Gutbrod (died 1886), a physician in Stuttgart, who originated the theory of recoil in explanation of the impulse of the heart, a theory adopted by Skoda but now abandoned; H. Locher (died 1873), a practising physician and subsequently a professor in Zurich, "Die Erkenntniss der Lungenkrankheiten vermittelst der Percussion und Auscultation. Ein Lehrbuch, bearbeitet für Studirende und prakt. Aerzte", 1853. "Somewhat more attractive perhaps in externals and more elegant in form; the crust somewhat harder, the crumb a little whiter, with less bran and only a shade less oppressive in the stomach" (see Preface), a work ingeniously written and distinguished by historical remarks. By the same author, "Zur Lehre vom Herzen", 1860; Dr. Fr. Wilhelm Theile (1801–1879) of Buttstadt near Weimar, in 1827 a professor in Jena, 1831–1853 professor in the newly erected university of Bern, which latter position he resigned in the year last mentioned to become medical counsellor and a practising physician in Weimar (Die physikalische Untersuchungsmethode oder Anwendung der Inspection, Palpation, Mensuration, Succussion, Percussion, Auscultation und auscultatorischen Percussion im gesunden und kranken Zustande. Nach Barth und Henri Roger

Traité pratique d' auscultation suivi d'un Précis de percussion, 4. Ausg., 1854, and H. M. Hughes' Practice etc., 1855); F. Günsburg, "Klinik" etc., 1856; H. Bamberger (1822–1888), born near Prague, Oppolzer's assistant in 1850, professor in Wurzburg 1854 and in Vienna 1872, "Herzkrankheiten", 1856, etc.; Alois Geigel (1829–1887) of Würzburg, professor of hygiene and of the policlinic in that city, specially known as a hygienist and for a pneumatic apparatus (Schöpfradgebläse, hydraulic bellows?), "Beiträge zur physikalischen Diagnostik mit besonderer Rücksicht auf Form and Bewegung der Brust", 1855; Louis Traube (1818–1876), professor in Berlin, where he popularized physical diagnosis and cultivated experimental pathology, "Zusammenhang der Herz- und Nierenkrankheiten", 1856, etc.; Dr. M. Schwanda (1823–1885), chief physician and professor of the theory of medicine in the late "Josephs-Academie", and subsequently in the University, "Anleitung zur physikalischen Krankenuntersuchung und Diagnostik", etc., 1857; M. A. Wintrich, professor in Erlangen, "Einleitung zur Darstellung der Krankheiten der Respirationsorgane", 1854, the best work after Scoda's book; Dr. Eugen Seitz, professor in Giessen, and Fr. Zamminer (died 1859), "Die Auscultation und Percussion der Respirationsorgane", with numerous dissertations under his presidency by Piersch, Kobelt, K. Drescher, H. Steinhäuser, Conrad, Dikoré, K. Heyer, C. Schmidt, K. Schuster, H. Salzer and others; Dr. E. Harless (1820–1862, son of the famous theologian Ch. Fr. Harless — 1773–1854 — in Jena and Bonn, author of a "Lehrbuch der plastischen Anatomie", 1856), "Tabellen zur Auscultation und Percussion"; Karl Christian Adolph Jacob Gerhard (born 1833) of Speier, formerly professor in Würzburg and now Frerich's successor in Berlin, "Lehrbuch der Auscultation und Percussion mit besonderer Berücksichtigung der Inspection, Betastung und Messung der Brust und des Unterleibes zu diagnostischen Zwecken", 1866; Dr. O. Leichsenring in Cologne, "Physikalisch-diagnostische Bemerkungen zu H. v. Luschka's[1] Lage der Bauch-Organe des Menschen"; P. Guttmann, "Lehrbuch der klin. Untersuchungsmethoden für die Brust- und Unterleibsorgane", 2d edition, 1874; with numerous journalistic articles by Bamberger, F. Betz in Heilbronn (editor of the "Memorabilien" of C. Bartels, 1811–1878) professor in Kiel; Adalbert von Ducheck (1824–1882), one of the most popular of physicians and a professor in Vienna, succeeded by Nothnagel from Jena; and numerous others. Duchek as early as 1860 reproached the representatives of the new Vienna school with confining themselves to the investigation of the products of disease, instead of investigating its origin. Nothnagel too in 1882, in his inaugural address, attacked the specialism which the new Vienna school had called into existence, and emphasized once more practice and its demands as a chief duty of the physician — a thing which the new Vienna school, with Skoda, Dietl etc at the head, fairly shuddered at. "One thing can never be learned, but this they (students of medicine) must themselves bring with them as their best endowment in their future calling. All knowledge attains its ethical value and its true significance only by the humane sense in which it is employed. Only a good man can be a great physician. All your knowledge and ability receives the stamp of genuine nobility only by the spirit of true humanity in which it is employed. With the intellectual and the scientific education, the education of the feelings and the manners must run parallel. You know that it is not the duty of the clinic to teach the latter, but as your future instructor, I hold it my duty at the commencement of our common labors to at least point out this question, which I look upon as one of the weightiest importance for all professional treatment." These maxims should likewise be laid to heart

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1. Luschka (1820–1875) of Constance was professor of anatomy in Tübingen and the discoverer of the coccygeal gland in man etc. He wrote "Die Brustorgane des Menschen in ihrer Lage", 1857, with numerous other works.

by those professors, who for colossal fees bestow their care upon the wealthy, but "utilize" the poor as "material" and "objects" in their clinics. — The great compilation of Dr. Paul Niemeyer entitled "Handbuch der theoretischen und klinischen Percussion und Auscultation vom historischen und kritischen Standpunkte", 1870, may be regarded in a certain degree as a summing-up of the department of percussion and auscultation. Niemeyer (born 1832) is the brother of Felix von Niemeyer (1820-1872), the popular clinician and practitioner of Tübingen, whose famous "Lehrbuch der Pathologie und Therapie"— recently thoroughly revised and edited by E. Seitz, who lectured from it and therefore knew it perfectly — spoke in behalf of therapeutics at a time when the Nihilists of Vienna still gave the tone to medicine. After being translated into the chief languages of Europe, it was also published in Arabic by Selim Bey, physician to the Viceroy of Egypt.

The new Vienna school as early as 1848 attained the summit of its greatness, and maintained its original tendency only until the sixties, though its founders and their immediate pupils occupied the chief professorial chairs still longer. Its successor, the "Young Vienna School", enlarged still further the field of specialties and emphasized more the department of therapeutics, but it created no new system proper or new field of investigation, as e. g. Koch in Berlin has done.

It is singular that within the new Vienna school, in contrast to the school of natural history, no work on the general subject of pathology and therapeutics was written by any of its chiefs, unless we consider the published lectures of Oppolzer such a work. This very fact is an open expression ot its tendency to specialism.

Besides the two chief branches of pathological anatomy and physical diagnosis, still other specialties were cultivated or created by the new Vienna school.

Up to the present time microscopic anatomy has not occupied in Vienna that important position, which has been assigned to it in Germany. In addition to Rokitansky, it was chiefly developed by

CARL WEDL (born 1815) of Vienna,

from 1853 professor of histology, who cultivated particularly the department of pathology (Grundzüge der pathologischen Histologie, 1854; Atlas der pathologischen Histologie; Beiträge zur Pathologie der Blutgefässe; Pathologie der Zähne mit besonderer Berücksichtigung der Anatomie und Physiologie, 1870, etc.). Damian von Lambl and S. Stricker (Studien aus dem Institute für experimentelle Pathologie in Wien, 1870; Handbuch der Lehre von den Geweben des Menschen und der Thiere, 2 vols. 1872) have also devoted attention to microscopic anatomy.

An indigenous specialty proceeding from the new Vienna school is that of Laryngoscopy or Laryngo-therapeutics, which owes its existence to the application of the investigations and researches of Liston and Garcia in the hands of

JOHANN NEPOMUK CZERMAK (born 1828, died of diabetes 1873) of Prague,

professor in Gratz, Cracow, Pesth, and finally a private savant in Leipsic. His work was entitled "Der Kehlkopfspiegel und seine Verwerthung für Physiologie und Medicin", 1860. Czermak also cultivated Rhinoscopy. Contemporaneously with Czermak the laryngoscope was adapted to practical purposes by

Ludwig Türck (1810–1868), professor in Vienna, who published "Praktische Anleitung zur Laryngoscopie", 1860; "Klinik der Krankheiten des Kehlkopfs und der Luftrohre" etc., 1866; Atlas zur Klinik der Kehlkopfkrankheiten, Tafeln von Dr. A. Elfinger und Dr. C. Heitzmann, 1866. Their footsteps were followed by

Dr. Friedrich Semeleder in his work "Die Laryngoscopie und ihre Verwerthung für die ärztliche Praxis", 1863, and professors Joh. Schnitzler, a skilful laryngo-surgeon (Entfernung von Kehlkopfspolypen ohne vorausgeschickte Tracheotomie, 1880, etc.), Störk and von Schrötter, the latter a favorite pupil of Skoda.

Undoubtedly the most famous and important specialty of the new Vienna school however, is that of Ophthalmology. It is sufficient to merely mention the names of the representatives of this branch to render it clear what a height the latter has attained in Vienna. At the head should be named Anton von Rosas (1791–1855 of Fünfkirchen, "a leader of the reactionary movement", whose "Handbuch der theoretischen und praktischen Augenheilkunde", Vienna, 1830, contains also an abridged history of this branch. No less important was Beer's pupil and son-in-law, Friedrich Jager (1784–1871), Ritter von Jaxtthal, of Kirchberg in Würtemberg, who, like Rosas, performed the extraction of cataract through a flap in the upper segment of the cornea, discovered the contagiousness of blenorrhœal ophthalmia (1811), practised the inoculation of gonorrhœal pus in pannus, removed the edge of the lid in entropium etc. His elder brother Carl, as well as his son Eduard, famous as an ophthalmoscopist (particularly in the investigation of the upright image and in refractive ophthalmoscopy, which latter he created) and as a brilliant operator, likewise enjoyed great reputation as oculists. The latter, who, in spite of all the fame acquired by his immortal "Atlas", had been for 25 years (!) only an extraordinary professor of ophthalmology, one year before his death received the appointment of ordinary professor of this branch. He published "Staar und Staaroperationen", "Ophthalmologischer Atlas", and gave to the profession "Jager's Test-Type" and "Jager's Ophthalmoscope". Joh. Nepomuk Fischer (1787–1847) in Prague. Ferdinand Arlt (born 1812), besides his excellent handbook in three volumes "Die Krankheiten des Auges fur praktische Aerzte", is best known as associate editor of the "Archiv für Augenheilkunde", published in conjunction with the great Dutch physiologist and ophthalmologist Donders, and the famous Albrecht von Grafe (1827–1870), cut off prematurely by death. K. Stellwag von Carion, author of "Die Ophthalmologie vom naturwissenschaftlichen Standpunkte" and "Lehrbuch der praktischen Augenheilkunde". Prof. Jos. Pilz in Prague; Hasner von Artha of the same city; Otto Becker (born 1828) in Heidelberg, a scion of the Vienna school (Linsenkrankheiten, Pathol. anat. Atlas der Augenkrankheiten etc., etc.); Leber in Gottingen, L. Mauthner in Vienna, Fuchs in Prague, von Reuss in Vienna etc.

The semi-surgical specialty of Dentistry[1] also found in Vienna an honored place, at a period when it was scarcely taught in other universities. Among its active cultivators were Gg. Carabelli (born 1787), professor Franz Nessel, and others who had private schools of their own.

The later specialty of Otology likewise had within the Vienna school some famous representatives, particularly recently in Josef Gruber and A. Politzer, the latter the discoverer of the so-called "Politzer's method" of forcing air into the Eustachian tubes during the action of swallowing.

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[1] The earliest dental clinic in Germany was established by Prof. E. Albrecht (1825-1883) in the year 1855. As the manifest result of the reformation of odontology which began in America, dental institutions connected with the universities have been already established in Berlin, Halle and Munich, and a similar institution is planned even in Vienna.

Hydrotherapeutics too is taught in Vienna, and Andr. Pleniger (Physiologie des Wasserheilverfahrens, 1863) and Wilhelm Winternitz are especially eminent in this department.

Electrotherapeutics is represented by Prof. M. Benedikt, who, however, has recently devoted his attention to abstract questions of natural philosophy, reducing the feelings of pleasure and dislike under laws, as mentioned above. Other electrotherapeutists are Friedrich Fieber (1836–1883) of Prague, privatdocent and Primararzt, who likewise lectured on the therapeutics of inhalation; Franz Chvosteck (1834–1884), Professor extraordinary and Chief Staff-physician; Professor Dr. M. Rosenthal and others.

Psychiatry is represented by Ernst von Feuchtersleben (1806–1849), M. Leidesdorf, Th. Meynert, the latter a professor in Zurich and founder of a clinic for diseases of the cerebrum. State-medicine, by Prof. J. Dominik Hauschka. The Diseases of Children have received excellent study at the hands of L. von Mauthner (Kinderdiätetik, 1853); Leopold Politzer (1815–1888), from 1850 conductor of the first institution for sick children, founder, together with Schaller and Mayer, of the "Jahrbuch der Kinderheilkunde", and at an earlier period Schaller's assistant; Alois Bednar (Lehrbuch der Kinderheilkunde); Joseph Kaulich (1830–1886), professor of the diseases of children and of medicine in Prague; Hermann Wiederhofer in Vienna; Joh. Steiner (died 1876), professor in Prague (Compendium der Kinderheilkunde); the ingenious, but unfortunate — he died of epilepsy — Gottfried Ritter von Rittershain (1823–1883) in Prague; L. Fleischmann (1840–1878) in Vienna, who belonged to the Young Vienna School; Hüttenbrenner, A. Monti and others.

Physiological and pathological chemistry has its representatives in Florian Heller, F. C. Schneider, Vincenz Kletzinsky (1826–1882) of Guttenbrunn in Lower Austria, Rochleder (died 1872) and Ludwig Jr. The anatomist of the Vienna school is the classic author in his department, Joseph Hyrtl (born 1811), of Kis-Marton in Hungary, the 17th edition of whose "Lehrbuch" appeared in 1884. He also wrote "Das Arabische und Hebräische in der Medicin", 1879, and "Onomatologia anatomica", 1880. In Prague anatomy was represented by Karl von Patruban (1816–1880), who was likewise active as a surgeon. The physiologist of the Vienna school is Ernest Wilhelm, Ritter von Brücke (born 1819) of Berlin, who in 1879 was the first Protestant to attain the Rectorate in Vienna. At an earlier period he had been a professor in Konigsberg. His chief works relate to the physiology of the eye and the voice.

Experimental pathology is represented by Prof. S. Stricker and Hans Kundrat, and

Hygiene, quite recently by Prof. J. Nowack.

Leopold Wittelshofer (1818–1888), the founder of the first German weekly medical journal, the "Wiener med. Wochenschrift", and one of the most talented conductors of such organs, must be regarded as the most eminent journalist of the "New Vienna School". In the "Young Vienna School" his place is taken by Joh. Schnitzler (born 1835 in Gross-Kanisza) and Wilh. Schlesinger (born 1839), the former Editor-in-chief of the "Wiener med. Presse" and now of the "Internationalen Rundschau", the latter of the "Wiener med. Blätter"; Karl Bettelheim (Medic.-chirurg. Rundschau) and others.

In spite of some variations from the new Vienna school (which, indeed, laid claim to the character of a natural scientific school), as regards manner and ideas the schools of physiological and rational medicine, which partly preceded and were partly contemporaneous with it, as well as natural scientific or exact medicine (now first properly so called), may be counted among its offshoots. The latter system, however, should be regarded rather as a development of the Vienna school, inasmuch as its chief representatives were either educated in Vienna or received a lasting impulse from the school in that city.

Among the champions of the German

a) PHYSIOLOGICAL MEDICINE

— a title which Broussais, as we know, was the first to claim for his system — appeared in his own "Archiv für physiologische Heilkunde", from 1842 onward, the eminent Marburg surgeon, surgical anatomist and operator, W. Roser (1817–1888) of Stuttgart, 1841–51 a privatdocent in Tübingen, and from 1851 professor of surgery in Marburg; W. Griesinger (1817–1868) and Karl Reinhold August Wunderlich.

Wunderlich (1815–1877), the son of an Oberamtsarzt in Würtemberg who subsequently lived as medical counsellor in Ludwigsburg, graduated in Tübingen in 1837. Continuing his education in other German and French universities, he was appointed in 1841 assistant to the medical clinic in Tübingen. In 1843 he became extraordinary professor in place of the clinician Hermann, and in 1846 received the position of ordinary professor in the same clinic. From 1850 onward he occupied a similar position in Leipsic, where he succeeded Oppolzer. He died of cancer of the retroperitoneal glands. Wunderlich was famous for the general excellence of his character, which was exempt from excessive self-esteem, intrigue and lust for power, and continued benevolent, just, mild and truly noble. Besides his chief works mentioned below, he wrote "Wien und Paris", 1841; "Geschichte der Medicin", 1859; "Grundriss der speciellen Pathologie und Therapie", 1858, and "Versuch einer pathologischen Physiologie des Blutes", 1844. His successor in Leipsic was E. Wagner, author, in conjunction with Uhle, of a treatise on general pathology.

These champions formulated "the demand that we must break away from the current ideas and gain a refined foundation for experience by means of a different method, and one associated with physiology." "The attack was directed against the antiquated views of the German Symptomatologists and Idealists, and particularly against the school of natural history which reposed in the most absolute domination . . . and a single powerful thrust, the unconcealed expression of the word . . . must be able to complete the passage from the old to the new era." "The doctrine of the organism, or, what amounts to the same thing, the doctrine of life is physiology. Physiology therefore, in its strict sense, must include all vital phenomena. That from a certain portion of these phenomena, to wit those called morbid, a special science has been formed, is an artificial, but yet a practical division". (Wunderlich.)

Physiological medicine also departed from the Vienna school in the fact that it did not, like the latter, occupy itself exclusively with pathological anatomy and diagnosis, but also utilized physiology to explain pathology.

Wunderlich's "Handbuch der Pathologie und Therapie", 2d edition, 1852, is one of the best of our modern text-books, and in particular is distinguished by devoting sufficient attention to the historical element of individual diseases, as well as by the fact that it leaves to thought and the ordinary senses, that is to the Hippocratic methods of investigation, their just rights Unfortunately it has not recently appeared in a new edition, in which the wreck of its symptomatology etc. might have been avoided. The general conceptions of organism, health, disease and convalescence were developed as follows: "The idea of sickness presupposes the idea of organism. Each organism is a system of individualities, of organs. Its essence, however, is more sharply distinguished in the history of the organism, than in its existence. . . . Its essence consists in a perpetual change, as well in its relations to the outer world, as in its own internal relations. The sum-total of the processes in and upon the organism we call its life. Many of these processes correspond more or less completely to the other processes of nature which we are in the habit of calling physical (mechanical) and chemical. In apparently similar conditions certain actions, e. g. endosmosis, do not occur in the organism. . . . The organism does not form the so-called organic-chemical combinations: it is only when occasion is given in it that these are formed. . . . Besides mechanical and chemical processes, which too undoubtedly differ essentially from those in the retort in accordance with their cause, Wunderlich distinguishes the "vital processes in a more limited sense", over which "the nervous system" presides. — "Health is that condition in which the internal processes of the organism take place and succeed each other in a quiet, precise, uniform way, so as to correspond, for the most part, to the idea of the organism, and to furnish the greatest guarantee for its continuance" — a pure abstraction, which appears no more physiological than the well-known definitions of earlier date. "The constituents of the organism manifest abnormal processes, functionate abnormally, something abnormal takes place in them; this is to be sick in its proper sense." "There is a difference between this and the disease, which properly only defined the 'trivial consciousness', in which science always overlooked the principle of this definition. . . . . We can say in a certain sense, however, that there are no diseases at all, only disturbed organisms, sick individuals, sick organs." If, however, one has obtained a clear idea of the want of scientific accuracy in the conception, he may employ the *expression* without harm or danger. Wunderlich rejects any vis medicatrix naturæ. "Convalescence presupposes that all disturbances of function are adjusted, organic disturbances, which impair the integrity of the tissues, removed. lost portions of tissue restored and the diseased products, incapable of use in the latter way, carried off. Recovery is to be regarded as a result which has its complete and adequate foundation in the totality of the preceding relations, as the consequence of favorable constellations, and not as the work of a special and active force (Naturheilkraft) existing for this purpose." Wunderlich laid down as methods of cure the directly curative (abortive) and the expectant, the latter of which he considered valid so much the more frequently, because many diseases end favorably without treatment, indeed in spite of the most preposterous treatment. In opposition to the nihilism of the new Vienna school he raises his voice in the defence of therapeutics — he was a good theorist as well as practitioner — but without specially emphasizing the humane side of medical treatment. "Although in almost all forms of disease a number of cases get well without the physician, and in many diseases numbers are lost in spite of all medical efforts, there yet remains a considerable number of cases, where an intelligent interference on the part of the physician is of the most decided consequence. It is too a very limited conception of professional activity to believe that its sole object is to restore health to the sick. The shortening of suffering, the removal and mitigation of inconveniences, the alleviation and rendering endurable of the condition, the protection from threatening dangers, all these are quite as serious and quite as worthy duties for professional exertion", in which undoubtedly philanthropy must be the chief support of the physician. — Recently, as we know, Wunderlich, by his revival of the thermometry practised by Santoro, Boerhaave, de Haën and others has acquired many fruitful ideas in diagnosis and prognosis, without himself basing upon this single symptom a one-sided system of therapeutics. His work on this subject was entitled "Das Verhalten der Eigenwärme in Krankheiten" etc., 1868

Wilhelm Griesinger, born in Stuttgart, for four years (1850–1854) Director of the medical college at Kassr-el-Ain near Cairo, President of the Egyptian Board of Health and then a professor in Zürich, Tübingen and Berlin (from 1865), was specially influential in the development of alienistic medicine in Germany (Pathologie und Therapie der psychischen Krankheiten, 4th edition, 1876), and upon the theory of nervous and infectious diseases. The latter subjects he discussed in Virchow's "Handbuch".

Wilhelm Roser, the third associate in the foundation of the school of physiological medicine, was its representative in the department of surgery, and particularly in topographical and surgical anatomy.

A phase of the New Vienna or positive school, differing in scarcely anything but its definition from physiological medicine, is the so-called

β) RATIONAL MEDICINE,

originated by the clinician C. Pfeufer (1806-1869) of Bamberg, professor in Heidelberg and ultimately in Munich, and the famous and important anatomist Fr. G. Jac. Henle (1809–1885) of Fürth, professor successively in Zürich, Heidelberg (1844) and from 1852 in Göttingen. This school has also been represented by a special journal, the "Zeitschrift für rationelle Medicin", since 1841.

While Wunderlich claimed pathology as "the physiology of sick men" Henle declares this idea questionable, and makes no distinction at all between the physiology of the healthy and the sick: "for the physiology of the healthy and of the sick are not different, physiology and pathology are one." This is established as follows: "We may call the destruction of a house attacked by fire a misfortune; it is nevertheless physical. We may likewise call the expression of life produced by an injury a disease; nevertheless it remains physiological. From the action of such abnormal influences, out of which disease arises, we even learn to recognize the fruits of the healthy organism."

Henle, a Doctor of Philosophy, Law and Medicine, born at Fürth in Bavaria studied from 1827 in Bonn, Heidelberg and Berlin under Joh. Müller. Imprisoned as a member of the "Burschenschaft", he became a privatdocent in Vienna in 18 professor in Zurich 1840, in Heidelberg 1844, professor of anatomy in Gottingen 185 (Handbuch der systematischen Anatomie, with an "Atlas"). He also wrote numerous treatises on anatomical, physiological, pathological and microscopic subjects and in conjuction with Rud. Alb. Kolliker (born in Zurich 1817, and since 1847 professor of physiology and anatomy in Wurzburg), was a very eminent promoter of the study of microscopic anatomy in Germany. The epithelium, in our present sense of that term, was, among other things, named and discovered by Henle.

The leader of "Rational Medicine" (Hegel may be regarded as the indirect godfather of this science), in contrast to the founders of the New Vienna school, distinguished himself also by an historical sense, inasmuch

as his "Handbuch der rationellen Pathologie", 1846, exhibits a very good historical sketch as its introduction.

The language too of this school, in contrast to the preceding schools of the philosophy of nature and natural history which it directly assisted in setting aside, was in the time of its origin confident and ingeniously triumphant. But in spite of its realistic efforts it did not forget philosophic speculation, i. e. hypothesis. On the contrary, it paid formal honors to the latter. "However soberly we review the phenomena of disease and recovery in themselves, the arbitrary, therapeutic assault is inconceivable without presupposing that in corresponding cases a curative method and the subsidence of the disease may have stood in a definite causative relation. Now on this ground it is a delusion to believe that in medicine we can ever stand upon a purely empirical basis. Through this single conclusion all medical experience, in so far as it may be controlling, becomes an hypothesis. . . . We have, therefore to test practical facts, not according to the rule by which we judge the normal in the phenomena of the senses, but by the rule according to which we try hypotheses concerning the internal connexion. . . . The true touchstone of such hypotheses is experiment. . . . Medicine has become conscious that it has no advantage of the other experimental sciences; that it can take no step forward which has not been first marked out by an hypothesis. The day of the last hypothesis would be likewise the day of the last observation. . . . From their ephemeral existence we are led to believe that we can deny to hypotheses any participation in our knowledge. This is never just. . . . An hypothesis displaced by new facts dies an honorable death. If it has itself summoned to its trial the facts by which it is annihilated, it deserves even a monument of gratitude."

Such hypotheses, however, are essentially nothing but theories, or rather a concession to the demands of the reflecting mind, in contrast to the perceptions of the senses. They are, therefore, distinguished from the systematic thought of preceding times only by their transitoriness and their lack of comprehension of greater spheres.

Henle defines the duty of the physician to be the prevention and cure of diseases. Here two methods of proceeding are to be distinguished, the empirical and the rational (theoretic, physiological). The latter is likewise the method of physiology; it is the method of all experimental sciences and particularly of the natural sciences. Moreover the genuine scientific spirit is said to consist not in ignoring or scorning philosophy, but "in the conscious and provisional renunciation of the knowledge of the first cause of things, because the time of proof is not yet past". "Accordingly if the collection of experiences is the chief thing, yet hypotheses must form a balance to its instability." "The means of advancing from the observation of the individual and the approximate to more comprehensive conclusions is found in the interchanging method between hypothesis and experience, between asking and hearing, to which the physical sciences owe their lustre. Perfectly pure and unprejudiced experiences are impossible, not only in the department of medicine, but generally. To express a perception of the senses is to separate the essential, as subject, from the accidental, as predicate, to concede hypothetically at least that the subject could also be conceived of without that predicate, or with other predicates." "The causal connexion of phenomena is concluded from the coincidence of the latter with definite, material changes. In experimenting we fix arbitrarily the cause, so far as possible, and by observing the results we assure ourselves of the correctness of our conclusions. In this process the so-called localization of symptoms, that is the search for the organ from which the symptoms proceed, is aimed at, but in addition too, a knowledge of the quality of pathological changes, by a comparison of the altered form and composition with the normal. . . . . Pathology owes its weightiest facts to the employment of the microscope and to organic chemistry." Moreover the hypothesis of a vital force is admissible, and is just as good, or as weak, as that of electric attraction or of gravitation.

Disease is "a deviation from the normal, typical, i. e. healthy, process of life, a modification of health, a removal from the relative norm. The essence of disease however, is: an expression of typical force under unwonted conditions." Disease too, like life itself, is a process. Diseases are anomalies of this process. Any alteration which completely abolishes this process occasions not disease, but death. Death is the cessation of the interchange of material. The termination in health follows spontaneously, or through artificial or accidental influences. The transition to health ensues gradually in most chronic, and in many acute diseases: in others, especially in acute cases, the symptoms disappear suddenly. The first and slower method is called lysis, the last method, crisis — the latter term a relic handed down from the mythical beginnings of medicine. If we desire to preserve the expression critically and definitely for certain morbid symptoms, it may be done (the few cases where it holds excepted) without the active secondary signification which the use of language has connected with these words. A critical secretion is, in the main, nothing more than a secretion belonging to the stadium of the crisis. "The belief in crises, according to Henle, stands upon the same footing as belief in the devil. That the exorcist had expelled a devil was demonstrated by the foul odor left behind by the evil spirit. The odor was a fact; that it could be diffused in no way except by the devil — was perfectly self-evident." The same was the case with critical perspiration, urine etc.

The earliest eminent representatives of French precision in Germany proper, whom we have just considered, took sides in their own way and with lively enthusiasm for the new scientific system, without, however themselves following it exclusively. Henle, especially, as we have seen even inclined to philosophical abstractions and speculations, and openly confessed that "true science does not consist in ignoring or despising philosophy." He likewise leaves open to deductive treatment a door which was at first entirely closed, as the originally justifiable, but finally exaggerated, reaction against the earlier and one-sided synthetic cultivation of medicine now degenerated into the opposite extreme of one-sided analysis. The latter is the case with exact or natural-scientific medicine properly so called, which dates from the last fifty years, and of which the last theoretic offshoot in order of time is found in the cellular pathology to be discussed hereafter. The latter, under the leadership of natural scientific methods, characteristically heaps up inductive material, without the ability, like the natural sciences, to arrange this mass upon deductive principles, since such principles have up to the present time been wanting in medicine. From its exclusively realistic tendency, sooner or later, as the result of all historical experience, it will, however, awaken the contrary current. Such seems to be a requisite for the historical development of medicine, as it has shaped itself since the beginning of modern times.

It is a striking and curious, though not absolutely inexplicable phenomenon, that beside the Vienna system the Pseudo-Paracelsian

1. System of Rademacher

was able not only to make its appearance, but even to find followers.

Paracelsus, that great star, which emerged like a comet from the intellectual horizon of the 16th century, its long train reaching and sparkling, as we know, throughout the whole 17th, while its head and nucleus had long disappeared, had the fortune in the 19th century to awaken two astrologers, the one shrewd, the other credulous, who sought, each for his own purposes and in his own method, to interpret him to the physicians of his own time. But the great physician and thinker of the 16th century, who formed a brilliant picture within the frame of the civilization of that day, could appear only as an historical caricature and an anachronism in the 19th century, with its realistic and advanced methods, even if transferred in his entirety to its civilization. How much more must this be the case when his interpreters elaborated only two of his dogmas, i. e. each of them one! Yet it is an evidence of the greatness of the man, that from the treasures of his mind two dogmas were important enough to form the basis of two "schools" in the 19th century. But this very mistake of both his interpreters served — and this is the sole advantage to compensate for the great injuries which it inflicted upon medicine — at least to vindicate the memory of one long misjudged, and to verify what he declared to his contemporaries: "Truly I shall accomplish more against you after my death than before."

One of these Epigoni, Hahnemann, we have already considered. The other was

JOH. GOTTFRIED RADEMACHER (1772–1849) of Hamm in the county Mark, a practising physician at Goch on the lower Rhine, who studied Paracelsus kindly, with honest sincerity and with a simple heart, while Hahnemann had falsified him.

"Probably to the very end of my life I should, alas, have been unable to attain the power of healing — having my understanding partially crippled by scholasticism — if a concurrence of circumstances had not determined me to read the works of Paracelsus with attention, and if he had not lighted for me a candle, which I sought in vain from other physicians. That I followed this light is no special merit. Many of my colleagues, in whose heads, as well as in mine, there glimmered an obscure notion that between the rude empiric and rational empiric systems of medicine there must still lie a third intelligible system of empiricism, had they, like me, been driven by the force of external circumstances to an earnest study of the writings of Paracelsus, would have trod the same path and followed the same light. I think also that my assertion furnishes evidence of an honorable feeling, and far more of an humble, than a boastful mind. If I were a rascal or proud coxcomb, my friends, who wished to torment you, I should have kept entirely silent about Paracelsus, and have posed as if everything that I said to you was my own idea etc." (See Wunderlich). — The book in which Rademacher, after 46 years of practice, expounded his doctrine in more than 1300 pages, was entitled: "Rechtfertigung der von den Gelehrten misskannten verstandesrechten Erfahrungsheillehre der alten scheidekünstigen Geheimärzte und treue Mittheilung des Ergebnisses einer fünfundzwanzigjährigen Erfahrung dieser Lehre am Krankenbette," 1841, 4th edition 1852.

The teachings of Rademacher were based upon the precept of Paracelsus: "A natural, genuine physician says this is a morbus helleborinus, terpenthinus, not this is phlegma, chorryzza, catarrhus." Accordingly Rademacher classifies diseases in accordance with the remedies which experience proves curative in each. For it is impossible to distinguish the ultimate essence of the disease, its special point of origin and issue in the organism, but we learn by experience to use and to know the remedy which has accomplished the cure, and we should name the disease after this remedy. How experience is acquired the following history will teach.

A woman suffered from chronic vomiting and finally from pain in the abdomen especially in the neighborhood of the cæcum, and neither Rademacher, nor any other physician, was able to get at the bottom of the trouble. "Weighing everything well" it was a primary affection of the liver, transferred by sympathy to the intestines. Rademacher, however, "was quite at the end of his experience", but remembered that Stahl recommended the seed of St. Mary's thistle (semen cardui Mariæ) as "curative in those thoracic inflammations, which are associated with bilious fevers." Now Stahl's experience ran differently from Rademacher's, for "he had used the seed of St. Mary's thistle in diseases of the liver, and had removed sympathetic diseases of the chest, which are, as we know, not rare in these cases, better than with other remedies. Hence, thought I, it is probable that the seed of St. Mary's thistle acts favorably upon the liver and not upon the lungs." His idea was correct, for it was useful not only in the case mentioned, but likewise in coughs uterine discharges, epistaxis, ischias, associated with primary troubles of the liver or spleen, and once also in jaundice. It was now recognized as a "general chest-remedy" and Rademacher gave it in the form of a mixture obtained by boiling 15–30 grammes of the seed of St. Mary's thistle in 480 grammes of water over an open fire until reduced to 240 grammes.

According to the teachings of Rademacher there are three universal remedies: cubic-nitre, copper and iron, and accordingly also three primary diseases of the body in general, whose essence and seat are not known, but which must be called cubic-nitre disease, copper disease and iron disease, since, in spite of the fact that they are themselves unknown, they are certainly cured by these remedies. They are especially the basis of epidemic diseases — sometimes the one, sometimes the other, always, by the way, first recognized by the previous efficacy of the universal remedy — but interchangeably, so that e. g. in one epidemic disease, one and the same disease of the brain may be at one epoch a copper disease, at another an iron disease. We should also continually make other investigations until the remedy is found. If, however, the patient dies, the physician has probably not had time or skill enough to discover the correct remedy.

The three primary diseases, cubic-nitre, copper and iron disease, for the most part do not remain purely such, but almost always throw an organ into a condition of sympathy, and thus it results that an iron disease e. g. may express itself under the form of consumption, mania à potu etc., while a copper disease may appear as worms, paralysis, jaundice etc. Besides universal diseases and universal remedies, there are diseases of organs, diagnosticated by the efficacy of organ-remedies, and manifesting themselves as primary organ-diseases or as sympathetic organ-troubles. The latter, however, may in turn be transformed into primary organ-diseases. Again there are four great groups: abdominal diseases and corresponding abdominal remedies; head diseases with the necessary head remedies;

chest diseases and chest remedies; diseases of external organs, e. g. the skin, with the appropriate external or skin remedies, among which belongs cinchona, since intermittent fever is a sympathetic skin-disease. For each viscus again there is a special remedy, as for instance liver, spleen, kidney, pancreas, lung, heart, brain remedies etc., etc.

The followers of this doctrine, who modified it in some points, were some of them very capable observers. Among them were C. Kissel at Westerburg in Nassau (Handbuch der naturwissenschaftlichen Therapie, 1853; Handbuch der physiologischen Arzneiwirkungslehre); Gottlieb Latz (born 1818) of Cleves, a practising physician near Essen (Die specifische Heilmethode) and others. Among the journals of Rademacher's followers were: Löfflers "Zeitschrift für Erfahrungsheilkunst" and Bernhardi's "Zeitschrift für wissenschaftliche Therapie". Auerbach collected together the remedies of Rademacher, and the German Otterbourg, author of a book on medical Paris, introduced them into France. Prof. Ph Phöbus (1804–1880) of Markisch-Friedland (son of the physician Ludwig Phöbus, a pharmacologist at Giessen and founder ot a scientific theory of prescribing), a savant as thorough as he was modest, at least recognized the fact that Rademacher, "who unfortunately did not possess sufficient scientific education, benefited medicine by once again making the cure more important to physicians than simple diagnosis." In this Phöbus charged the new Vienna school, as well as the physiological and rational schools (including Schönlein himself), with too much skepticism, with breaking too rashly with the old medicine and with having frequently merely repeated what was in France already a thing of the past.

11. Hydrotherapeutics,

invented (or rather revived after Hahn) and generalized by the peasant Vincenz Priessnitz (1799–1852), should be mentioned among the medical theories, inasmuch as it is based upon gross views of the humoral pathology, according to which a materia peccans is to be expelled in the form of sweat, eruptions etc. Priessnitz accordingly laid great weight upon rustic and substantial fare and physical labor, and employed water therapeutically under the form of cold packs, girdle-poultices (Priessnitz poultices), frictions with cold water, general and local cold baths etc. He knew nothing of diagnosis and pathology, and as little of the individualizing of patients in accordance with their constitution, sex and age. The popularity of his establishment, which was erected with the permission of the authorities in 1830, gradually became enormous. Besides some successes, he had of course some failures also, but personally at least he reaped great profit and died worth several millions. Even before Priessnitz, E. F. Christian Oertel, a teacher in Ansbach, was a particularly active propagandist of the new treatment. There speedily arose a lively literary feud and agitation over the new system, not always carried on with the greatest courtesy, and in which J. H. Rausse (Anleitung zur Ausübung der Wasserheilkunde, 3 vols., 1852), C. Munde (Die Grafenberger Wasserheilanstalt, 1839; Hydrotherapie, 2d edition, 1868, etc) and others took a specially prominent part. In the hands of scientific physicians the treatment has been recently considerably elevated and improved. Among these physicians are A. Pleniger (Physiologie des Wasserheilverfahrens, 1863), F. Runge (Wasserkuren und andre physiologischen Heilmethoden, 1872) and Wilhelm Winternitz (Die Hydrotherapie auf physiologische Grundlage, 1877). — The teachings of Priessnitz were opposed by Joh. Schroth, a peasant in Lindenwiese, near Gräfenberg, who advocated the dry treatment, wheat bread and abstinence from fluids. He also found some followers. [According to Dr. Trall, the system of Hydropathy was popularized in England by the writings of Claridge, Sir

Charles Scudamore (A medical visit to Graefenberg to investigate the water-cure treatment, 1843) Johnson, James Wilson and James Manby Gully (1808–1881). The latter physician established a hydropathic institution at Malvern about 1842, and was the author of several treatises upon the water-cure system, as well as co-editor of "The Water-Cure Journal and Hygienic Magazine", London, 1847–48. The system was introduced into the United States in 1843 by Drs. Russell Thacher Trall (1812-1877), of Vernon, Connecticut, and Joel Shew of Providence, N. Y. The former opened a hydropathic institution in New York in the spring of 1844, and a similar establishment was founded at Lebanon Springs, N. Y. by Dr. Shew and David Campbell in 1845. A "Water-Cure Journal" was also started by Dr. Shew in 1844, but transferred in the following year to Messrs. Fowler and Wells of New York, who continued its publication for about twenty years. H.]

m. The Modern Chemical System

(in opposition to the chemical system of the preceding century, which was founded in inorganic chemistry), in accordance with the present great advances in organic chemistry, derived from this science its doctrines. It was called into life specially by Liebig's "Die organische Chemie in ihrer Anwendung auf Physiologie und Pathologie", 1842, and upon it our present theory of metabolism (Stoffwechsel — a term introduced by Liebig) is based.

According to this theory, the physical changes in the body, so far as they cannot be reduced to mechanical processes, are nothing more than a process of oxidation or combustion of the bodies, effected by the oxygen of the inspired air; the body itself is a mere living retort or higher class oven. The parts of the body are supposed to be thus destroyed and then regenerated, a theory refuted by Miescher and Voit.

This oxidation is a twofold process, in accordance with the two great groups of organic matter which compose the body or are introduced into it by the food. The so-called respiratory foods (hydrocarbons, fats) are burned in the lungs during respiration and chiefly excreted there as carbonic acid. The so-called nutritive materials (nitrogenous, plastic, blood-forming foods), which compose the tissues proper (except the adipose tissue), are consumed within the tissues, and are mainly discharged under the form of urea by the renal secretion. The quantity of urea excreted is regarded as a measure of muscular tissue converted in labor.[1] — If an insufficient quantity of the required materials is introduced into the body, the corresponding parts, composed of this material, are themselves consumed, a process manifested by emaciation or death by starvation, i. e. a discontinuance of the normal chemical metamorphosis. In diseases the normal reception or combustion is wanting.

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[1] Voit proved, on the contrary, that the excretion of nitrogenous matters, and particularly of urea, was only slightly affected by muscular activity.

[On the other hand, Prof. Austin Flint Jr. in 1870, from an analysis of the urine of the pedestrian Weston while walking one hundred miles in twenty-one hours and thirty-nine minutes, came to the conclusion "that excessively severe and prolonged muscular exertion increases immensely the amount of nitrogenized excrementitious matters in the urine, particularly the urea, and produces a corresponding increase in the elimination of most of the inorganic salts." H.]

Animal heat is the result of the process of oxidation or combustion in the oven of the body. The one class of foods — albuminoid, nitrogenous — serves for the formation of the blood and the construction of the formed parts of the body; the other class — non-nitrogenous, carbohydrates — is similar to ordinary fuel, and serves merely for the production of heat. "We heat our bodies, just as we do an oven, with combustible material contained in the elements above mentioned, as in wood and coal. The combustible elements consumed in the body are, however, essentially distinguished by their solubility in the bodily fluids." — This heating-process requires to be more active in cold weather, and hence a larger quantity of respiratory food must be ingested and converted during the prevalence of such weather — in winter and in northern climates.

Fever is an abnormal increase in the process of combustion, disease a defect in this process.

If a portion of one group of materials is lacking in normal and diseased processes, and if this is omitted or insufficiently regarded in nourishment, the deficiency is to be repaired by the introduction or increased ingestion of this group. This is the practical side of the doctrine.

The theory also regards the living organism from the stand-point of the chemist, the chemical retort and chemical analysis, and does not pay sufficient attention to the elective, adaptable side of the physical life of the organism, nor to the ever changing and powerful influences and relations in which individuals find themselves. Hence in practical life and at the sickbed it too, like all theories, left the physician in the lurch, and was soon combated by chemists and physiologists. Thus C. Voit seeks out merely the losses in metabolism, adopts a special class of "Genussmittel" which excite the nerves of digestion, thinks that fat may be formed by the splitting of albuminous bodies, when it does not exist in the food. He distinguishes "Nahrungsstoffe" — including water — "Nahrungsmittel" — the mixture of food — "Genussmittel", and "Nahrung", the combined mass of the last three.

Yet the theory had the advantage, by no means to be underestimated in the development of medicine, that it placed dietetics once more in the foreground in the very period when therapeutic nihilism was in its bloom, and that it taught us to consider the quantity and quality of the food from new, and often better, points of view than had been the case heretofore.

That in the sequel the mental and moral peculiarities of individuals, indeed of whole nations, were deduced from their nourishment or food (as was done particularly by Moleschott), was an exaggeration as wonderful as the anthropological idea which is nowadays becoming prevalent, and which appeals to the form and structure of the brain, that is to its human or animal conformation, in support of a system of inductive morals. Both are emanations of the realism and materialism of our age, which a future tendency of culture with historic necessity must and will bring again within narrower limits and correct.

n. Modern (Cellular) Vitalism.

The modern vitalistic theory of Rudolph Virchow (born in 1821 at Schievelbein in Pomerania), announced in 1858 and borrowed from the natural scientific medicine, is distinguished from that of the 18th century substantially by the fact that it breaks up the old, indivisible "vital force", distributed throughout the entire body or located in a few organs, into an infinite number of individual "associated" vital forces, working together and yet separately, and assigns to them in the elementary parts (which latter are considered to be the cells) a definite microscopic seat. It is simply a modified employment of the old idea of the vital force, referring the latter to the concrete, minutest parts, the so-called "corporeal elements" in the modern sense, which are entirely different from those of Bichat. "Every animal appears as a sum of vital unities, each of which bears all the characteristics of life. The characteristics and unity of life cannot be found in any determinate point of a higher organization, e. g. in the brain of man, but only in the definite, ever recurring arrangement which each element presents. Hence it results that the composition of a large body amounts to a kind of social arrangement, an arrangement of a social kind in which each of a mass of individual existences is dependent upon the others, but in such a way that each element has a special activity of its own, and that each, although it receives the impulse to its own activity from other parts, still itself performs its own functions."

Attention had been directed to the importance of the cell in vegetable and animal organisms at an earlier period by Sir Robert Hooke (who in 1677 discovered the cells of plants), Baumgärtner, Schleiden, Schwann (the discoverer of the animal cells, and also of pepsin) and Robert Brown (the discoverer of the cell nucleus). But it was not yet formally stated in medical theory that the cell was to be regarded as the proper, ultimate, vital element. This deficiency, or rather the gap which, through neglect of microscopic results in general, had arisen, and even obtruded itself, as it were, into medicine and medical theory, Virchow, as a leading histologist and pathologico anatomical investigator, filled at once and completely (taking into account the condition of microscopic investigation in that day) with his cellular pathology, and since that time the cell has assumed a position similar to that which the "fibre" occupied in the theories of the 17th and 18th centuries. Time will decide as to the vitality of this theory, which, like almost all earlier theories, found everywhere and immediately an enthusiastic reception. Virchow himself, like Rokitansky with his crasiology, seems to have been almost startled with his success. At least we may infer this from his subsequent silence with respect to his theory, and from some of his expressions in his address before the 50th Congress of Naturalists. — The principles of the Cellular Pathology are given in the following passage: "It would not suffice for me, as has been customary in the last decennium, to take pathological anatomy alone as the basis of my views. We must add thereto the facts of general anatomy, from which the temporary formation of the science has been acquired. . . . In this application of histology to physiology and pathology", which, as such, was not employed as something entirely new, for its application had been already made as early as the 17th century — the realistic predecessor of our own in almost all directions, and particularly in medicine — "it is a question", as he himself concedes, "chiefly of the recognition of the fact that the cell is actually the ultimate, proper morphological element of every vital manifestation — omnis cellula e cellula — and that we must not remove the proper action beyond the cell." In this lies the distinctive novelty of the theory, which, however, remains theoretic until the ultimate elements of the body, their action and their powers, shall be no longer a subject of discussion. This discussion, however, when we take into consideration the always rapid changes in microscopic interpretation, cannot, it would seem, for a long time be regarded as closed; for, as we know, its continuance being granted, the investigations of Cohnheim have already invalidated much of Virchow's theory. An element, as such, is characterized above all by its constancy. Its best criterion is "that we have in it the proper elementary structure which characterizes every living body, without the pre-existence of which no living forms arise, and to which the proper continuance, the maintenance of life, is bound" The most constant of all parts of the cell is the nucleus, not the so-called nucleolus, which is "no necessary desideratum", since it is lacking in many young elements. Next to the nucleus is the membrane. "The nucleus plays an extraordinarily important rôle, which relates less to the function, the specific action of the elements, than to the maintenance and increase of the element as a living part." The development or increase of cells is continuous, it takes place by continual growth of cells, and a new growth of cells presupposes existing cells. For the function, the contents of the cell, or even the material deposited outside of the cell, are of controlling importance. The tissues accordingly are functionally different. For instance, the contractile substance deposited within the smooth muscle-cell appears to contain the contractile force, and the cellular element of the nerves may develop into nerve-fibres, in which "the nucleus remains outside of the medullary substance as a constant form." In contrast to the cell-elements themselves, however, the intercellular substance also plays an extremely important part, and it is "governed" always within definite limits by a neighboring cell-element. Hence arise the cell-territories, i. e. districts within the intercellular substance upon which a certain cell exercises its nutritive etc. influence.

In this assignment to the intercellular substance of a pre-eminent and controlling part lies an important and distinctive, though very vulnerable and speculative, characteristic of the theory of Virchow, as contrasted with the earlier blood or humoral, and nervous or solid pathologies. Indeed this feature of the theory is even more novel than the employment of the cell itself. It elevates the part heretofore regarded as mere ballast, the true pariah of the body in the past, the connective tissue or interstitial substance of Bichat, to a position of veritable supremacy, and thus creates a trinity of bodily constituents laboring in unison. "Thus then it is certainly a just demand that a certain recognition should be granted to the larger part of the body, and if this recognition is allowed, that we should no longer be satisfied with the simple idea of the nerves as integral parts, as a connected, simple apparatus, or of the blood as a simple fluid material, but that we should admit also within the blood and the nervous apparatus a mass of active, minute centers." . . . . "We must remember that besides vessels and blood, besides nerves and central apparatus, there are still other things, which are not a simple substratum for the action of the nerves and blood, upon which the latter carry on their functions."

Among the three great tissue-groups which are alone to be admitted in the body, of which one comprises those forms composed of cells alone (cellular tissue in the modern sense), while another contains only those parts which display cells of specific action in the animal economy (the nervous and muscular apparatus, vessels and blood), there is still a third, the connective tissue (called at an earlier period the general cellular tissue), characterized by the fact that in it "each cell is regularly separated from the others by a certain intermedium", so that in this tissue the rôle of the intercellular substance is best studied.

The elements imbedded in the intercellular substance of the last group have very various forms, are long, angular or round. Some of them anastomose with the others, in which case, according to Virchow, they produce a new, third system of canals in the body (besides the well-known canalicular systems of the blood and lymph vessels), which "must be regarded as a new acquisition to our views, a kind of supplement to the old vasa serosa, which do not exist. This formation may occur in cartilage, connective tissue, bones, mucous tissue in the most various parts, but in all cases the tissues which possess these anastomosing cells differ from those in which the cells are isolated, by the greater readiness with which they originate morbid processes." This tubular system was a third new side of Virchow's original doctrines, equally important in the explanation of physiological nutrition and in that of pathological processes. According to his views, such a system of canals supplies a stream of plasma to places which are poorly provided with capillaries, e. g. in the bones, the interarticular cartilages, tendons, the cornea etc.

To each of these capillaries, however, is assigned a definite tissue district, so that besides the cell-territories there are also vascular territories, i. e. districts, which, as thrombosis, embolism and metastasis prove, are dependent, both physiologically and pathologically, upon one particular minute vessel, districts which manifest a vascular unity, from which we must return to the cell-territories in order to understand, how, in spite of so favorable an arrangement of the capillaries, the nutrition of the smallest cell-districts is accomplished.

The reception of nutritive material is effected through the activity of the tissue elements, in the form of an attraction of this material by these elements in proportion to their needs. If this eclectic reception (so to speak) by the tissue elements did not exist, it would be inconceivable "that the individual districts should not be exposed every moment to inundation by the blood." This assumption furnishes the first explanation of the fact "that the offered material is received into the different parts only in proportion to their occasional needs, and is carried to the individual districts in such quantity, that, generally at least, so long as any possibility whatever of maintenance continues, one part cannot be materially injured by the others."

This attraction of material in certain cases takes place in such a way that certain elements exercise a quite specific action, and manifest an elective affinity — specific affinity — for certain materials. Thus the hepatic cells attract sugar and bile from the passing blood, "reconstruct these materials within themselves, and either return them thus metamorphosed to the blood, or transmit them in the form of bile to the biliary ducts." What is true of the great secretory organs, cellular pathology applies also to the more minute elements. Thus "it concedes to an epidermic cell, a lens-fibre or a cartilage-cell, the capacity to take from the nearest vessels (not directly, but frequently by a long process of transmission) certain quantities of material, proportioned always to its special needs, to recompose this material for its own use or otherwise, and possibly even to its own destruction."

According to Virchow, the vascular system is completely closed by membranes, in which no pores can be recognized. " When we speak of the porosity of the walls of the vessels, this can only consist in the physical sense of invisible and properly molecular interstices . . . . . of the impossibility of a 'transudation' or diapedesis of the blood through the vascular walls, without rupture of their coats, there can be no possible question ; and though we cannot in each special case furnish evidence of the place of rupture, it is yet inconceivable that the blood with its corpuscles can escape in any other way than through a hole in the wall of the vessel. This is so perfectly evident from histological experiments that no discussion of the subject is possible", a discussion which, however, in spite of Virchow's apodictic proposition, was soon after opened by Cohnheim, and is still carried on.

A fourth view essentially distinguishing the cellular pathology from other systems, and especially from the humoral pathology, is found in the doctrine that the blood itself, whose cells are renewed from the corpuscular elements of the lymph, is not the proper and original cause of dycrasiæ, and particularly is not the cause of a continuous alteration of the tissues, the admissibility of which in chronic dyscrasiæ, according to Virchow, cannot be doubted. These dyscrasiæ arise because the blood, according to the new idea, is not an independent structure, but one dependent upon the condition of the tissues, in consequence of its continual conveyance of noxious constituents from certain points of the body. The blood, accordingly, is merely the medium for the production of the dyscrasiæ. The earlier humoral pathology, on the contrary, ascribed disease in its entirety to the blood itself, while the cellular pathology recurs to the organs for the ground and cause of blood diseases, and regards the blood changes as symptomatic and not the essence of disease. "As a continual conveyance of noxious nutritive material — e. g. alcohol in drunkards — may produce a permanent adulteration of the blood, so the continual disease of a certain organ may continually convey to the blood unhealthy material." In this cellular crasiology the modern principle of localization attains the utmost importance, since now the question in "dyscrasiæ" is to determine the place from which they take their origin — e. g. in the syphilitic dyscrasia, the local focus — a doctrine which would prove eminently useful in practical medicine if the local changes were always as accessible to treatment everywhere and at the proper moment, and would yield as readily to treatment, as a syphilitic ulcer.

The blood-crasis too in inflammation — it should be stated here that Virchow does not admit the existence of an *active* hyperæmia, because the vessels in general must be paralyzed to permit hyperæmia, (if they are "active" the result must be an ischæmia) — is one depending upon a local condition. The crasis presupposes this condition and does not occasion it, as was formerly assumed. The "phlogistic crasis" — i. e. the hyperinosis in inflammations particularly of the thoracic organs, depending upon an increased supply of "fibrinogenous" substance from the lymph, which is changed in the blood into fibrin, while the latter may be considered a morphological constituent of the blood — is an event depending upon the local inflammation. Wherever too fibrin is found outside of the blood it is not separated from the latter, but is of local origin, and it may be conveyed from this local point into the blood and produce there the inflammatory crasis, particularly when such organs as contain many lymphatic glands are attacked.

The new theory gained for the pathology of the blood several peculiar, symptomatic or morphological forms of disease, through a combination of the numeric method heretofore practised in regard to the corpuscular elements of the blood, with the new (cellular) localizing idea which looked back of the blood to the tissues.

The increase of fibrin (hyperinosis) is either associated with an increase of the colorless lymph-cells, which occurs under the condition mentioned above that the inflamed part is rich in lymph-glands; or, when the fibrin is diminished (hypinosis), the number of the lymph-cells alone is increased, as e. g. in typhous processes. The condition in which the colorless blood-corpuscles are increased in number as the result of an affection of the lymph-glands, together with an increased or diminished proportion of fibrin in the blood, Virchow calls leucocytosis. It occurs even physiologically after meals, inasmuch as the constituents of the chyle remain for a long period in the mesenteric glands and constitute for these a pathological irritant. In the so-called leucæmia, a most fatal disease, in whose discovery J. H. Bennett,[1] as already mentioned, claimed priority (1846), the proportion of fibrin in the blood is not the controlling element — it may be either increased, diminished or normal in quantity — but the number of the corpuscles. The lymph corpuscles appear to be increased in number, while the red blood-corpuscles, on the other hand, seem diminished in number, and this may proceed so far that the red and white cells may exist in equal numbers. Indeed it may happen that to every three red corpuscles we find two of the colorless, or even that the number of the latter may exceed that of the former (while normally only one white corpuscle corresponds to 300 red) and the blood may seem to be purulent. The primary seat of disease in leucæmia we find to be the spleen or the lymphatic glands, and we thus distinguish a splenic and a lymphatic leucæmia, both of which, however, are occasionally combined. To these two varieties a myelogenous leucæmia was subsequently added.

Leucocytosis, leucæmia and hyperinosis are also related to the lymph.

Pyæmia, in the sense of an absorption of actual pus, or rather of the passage of actual pus corpuscles, undistinguishable from white blood-corpuscles, into the blood, does not exist, for pus as pus can never be absorbed. In one case only may entire pus reach the circulation, that is when a vein is in open connection with a focus of suppuration, in which case a genuine intravasation occurs. In all other cases only the fluid portions of the pus can be absorbed, the pus becomes merely inspissated, and the corpuscular elements are left as a caput mortuum: or the whole of the pus may disappear, though only after it has become absorbable by a previous fatty metamorphosis of its cells. The pyæmia of past writers is frequently nothing but an increase of the white blood-cells, the result of a preceding and general irritation of the glands, occasioned by a local inflammation or suppuration, that is a pathological leucocytosis. Genuine internal suppurative phlebitis, which also exists but has its seat in the walls of the veins, is never the cause of pyæmia, though it has been generally assumed to be such since the time of Cruveilhier. In many cases the pyæmia depends upon the fact that a thrombus (or local coagulation of fibrin), which may remain in its place of origin or prolong itself into a vessel of larger caliber, softens centrally, and the white blood-corpuscles included between its fibres during coagulation are accordingly set free and reach the blood-current. Or a portion of the thrombus may break off, and by means of (capillary) embolism (discovered by Virchow as early as 1846 while studying leucæmia) excite metastatic inflammation, e. g. in the lungs, by which a leucocytotic condition is then produced in the blood. Frequently the metastatic inflammation becomes the sole evidence of a preceding destruction of a thrombus, so that we might speak of a latent pyæmia. In a third case corrupt, ichorous humors are taken into the body, and we must admit a dyscrasia (ichorous infection) occasioned by the ichorous substance which has gained an entrance into the body in an acute way — something like cadaveric poison — or rather a chemical infection.

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[1] O. Schulten (born 1818) in Odernheim, a practitioner of Rheinhesse, made the same discovery independently in 1858.

"These three different conditions may complicate each other, but do not always or necessarily occur together. If we wish to retain the idea of pyæmia, the term may be used for such complications; only we must not seek a single central point in a purulent infection of the blood, but consider the term a collective name for several processes differing in themselves."

While in leucæmia the white blood-corpuscles alone are increased in number, in chlorosis we find both the corpuscular elements of the blood diminished "without any definite disturbance of the mutual relations of the colored and colorless corpuscles." The lymphatic glands may be affected here also, though just how is not demonstrable. But the way for the disturbance may have been paved at an early period, for we frequently find the heart, the arteries and larger vessels, and the sexual apparatus imperfectly developed, a fact which leads us to infer a congenital disposition."

Melanæmia is characterized by the presence in the blood, in causative connexion with lesions of the spleen or severe intermittents, of minute colored particles, sometimes enclosed in forms similar to the colorless blood-corpuscles, at other times in more oval forms. — In typhous patients and those cyanotic from affections of the heart, in the infectious fevers of patients who have undergone an operation, in the course of epidemic diseases and even in mild intermittent fevers, we find increased numbers of "melanotic" (red) blood corpuscles, i. e. cells to be considered most probably old and decaying red corpuscles, and to be looked upon as forerunners of a blood-moulting, as one of the processes "in which from a clinical stand-point too the probability of an extensive destruction of the constituents of the blood within the circulation may be inferred."

Another alteration of the red blood-corpuscles, or rather most probably of their contents only (the respiratory substance), occasionally occurs in typhoid fevers, when they assume an acute, severe course. It may be distinguished as toxicæmia, because no morphological change occurs, though the function of the corpuscles to take up oxygen is abolished, and they are, as it were, paralyzed in the same way as in poisoning by carbonic oxide.

As regards the cancerous dyscrasia, it should be remarked that a more or less rapid infection occurs in proportion to the richness of the respective forms of cancer in parenchymatous juices. Indeed in the majority of cases this infection takes place by way of the lymphatics, which are totally unable to absorb actual cancer-cells. "A peripheral lymphatic vessel can never simply wash away into the blood the cells of cancer as it does the juices; this is conceivable and possible in the veins only", or through the lymphatics only when the glands have already become cancerous. The walls of the veins, however, must also have become cancerous for a dissemination of cancer to occur by way of the blood-current after the manner of an embolism. This kind of dissemination by embolic metastasis is at all events rare.' "The ordinary form of metastatic dissemination in cancer corresponds in direction rather to the organs of secretion."

In the doctrine of inflammation Virchow, in addition to the four well-known phenomena of inflammation, redness, heat, pain, swelling, has again taken up disturbance of function, which the surgeon Walther had already brought forward as characteristic of that process. In fact Virchow makes the latter the "ruling" symptom, so that in his theory it assumes the leadership among the phenomena of inflammation, taking the place of Galen's "heat", the "redness" of Boerhaave, the hyperæmia of Broussais, the "exudation" of the Vienna school (corresponding to the "tumor" of the Ancients) and the "pain" of the Neurists. "No one expects an inflamed muscle to perform its functions normally; everyone supposes that the contractile substance of the muscle has experienced certain alterations. No one expects an inflamed gland-cell to secrete normally, but we regard a disturbance of secretion as a necessary result of the inflammation. No one expects an inflamed ganglion-cell or an inflamed nerve to perform its functions, to react normally to irritation. According to our commonest experience, inflammation necessarily implies that changes in the composition of the cellular parts must have occurred, which alter the natural functional capacity of these parts." Such "alterations of nutrition", which at last involve once more a consideration of the cell, are manifested now as the result of the "inflammatory irritation", which is of a nutritive or formative kind. By this expression "we can properly imply nothing else except that, in consequence of some cause or other external to the part which falls into a state of irritation, and which acts upon it either directly or through the medium of the blood, the composition and constitution of this part undergo alterations which at the same time alter its relations to the neighboring parts (whether they be blood-vessels or other structures), and enable it to attract to itself, and to absorb from them, a larger quantity of matter than usual, and to transform it according to circumstances. Every form of inflammation with which we are acquainted finds in this its natural explanation. Of each it is true that it begins as an inflammation from the moment when the increased appropriation of material in the tissue ensues, and the further transformation of this material is begun." Virchow opposes the "exudation" theory of the Vienna school so strongly that he affirms "that, in the sense ordinarily accepted, there is no such thing as an inflammatory exudation, but that the exudation usually met with is actually formed from the material engendered by the altered condition of the inflamed part itself, and from the transuded fluids which originate from the vessels of the neighborhood" — that the exudation is properly an "educt".

Accordingly Virchow distinguishes two forms of inflammation : "the purely parenchymatous, in which the process runs its course within the tissue, without our being able to observe any exudation of the fluid of the blood ; and secretory (exudative) inflammation, which belongs rather to the superficial organs, in which an increased exudation of fluids from the blood ensues, carrying with it the peculiar parenchymatous materials to the superficies of the organs. . . . There are certain organs which under all circumstances manifest parenchymatous disease only ; others which almost always exhibit a superficial exudative inflammation." Moreover the parenchymatous form assumes the character of a degeneration, inasmuch as it has a tendency to alter the histological and functional constitution of an organ. "Every inflammation with free exudation occasions generally a certain amount of relief to the part ; it carries off a great portion of the noxious agents, and thus the part seems to suffer proportionately much less than one which is the seat of parenchymatous disease."

Besides inflammation, there are still allied to this two processes. passive congestion (stagnation in the venous system), that is a local increase of the blood with retardation of its current due to an increase of resistance and a diminution of the heart's force ; and fluxion (active hyperæmia, fluxion of Barthez, "Wallung"), i. e. increased and usually accelerated influx of the blood into a part, the result of a decrease in resistance as compared with the impetus of the blood. Both may exist together, for every passive congestion in the venous system brings with it a collateral active congestion. — Fluxion manifests itself by a pretty strong injection of the vessels, either sharply defined or fading gradually into the adjacent tissues, and finds its expression in redness (hyperæmia), pulsation and a local elevation of temperature, frequently more evident to the touch alone, than demonstrable by the thermometer.

If in the morphological portion of Virchow's cellular theory the vitalistic idea appears prominent, his views on the life and activity of the nerves show too a marked leaning towards the doctrines of Brown and Haller — a new evidence that in every theory, even in one which appears entirely new in name, old ideas continue to recur — for Virchow's custom of maintaining the rights of the past is one altogether commendable. "It is probably profitable to-day" — that it surely is — "to recognize historic rights, for in fact it is astonishing with what heedlessness those who prize as a discovery every trifle which they have themselves found out, condemn the results of their predecessors. I maintain my rights, and therefore I also recognize the rights of others." What would the modern physician, who desires even the laity to be so "informed" in medicine that they compassionately pity those who take any notice of the antiquated heroes of our art, think of Virchow?

Virchow also assumes nerve-territories analogous to the vascular territories, though larger than the latter. Both assert a certain independence of each other, so that very extensive parts may exist without vessels, others without nerves, "without throwing their nutritive conditions into disorder". In this he contradicts the neuropathological idea; for "the idea of a neuro-pathologist of the purest water is, as we know, that a nervous center is able by means of the nerve-fibres to exercise a special influence upon every minute portion of its territory. If in any small point of the body a mass of cancer or of pus arises, or a simple disturbance of nutrition ensues, the neuro-pathologist requires an arrangement by means of which the central organ is able to extend its action to the smallest districts of the periphery; some way or other by which its messengers, who are designed to convey its orders to the remotest points of the organism, can pass to their destination. Actual experience teaches nothing of the kind. Precisely in those places where we recognize terminal apparatus so extraordinarily complicated as in the organs of sense, the nerves have no relation to the nutrition of the part, and particularly no demonstrable influence upon elementary parts."

In the central apparatus of the nervous system each special function has its special elementary cellular organs, each kind of conduction finds its routes definitely marked out. Hence "that view which sees in the nervous system the special center of life is met with the enormous difficulty that, in the same apparatus in which it falsely locates unity, it finds once more the same division into many individual centers which the rest of the body presents, and that it can point out nowhere in the nervous system any actual center by which all parts are controlled as by a dictator." The nervous system in no respect represents the proper unity of the body.

There are, it is true, certain small cellular organs which serve as centres of motion, but there is no *one* ganglion to which all motion can be referred. The same numerous centers are also found in the ganglia which preside over sensation. Unity exists in our consciousness alone, and an anatomical or physiological unity has been up to the present time nowhere demonstrated.

The characteristic of life is activity. The latter, however, "takes place in no single part through a cause belonging to it from the beginning and entirely confined to it", but there is everywhere required a certain excitement or irritation, the cause of which is irritability — a theory agreeing entirely with that of Haller or Brown. This activity is "the criterion by which we decide whether the part lives or does not live". It is feeblest in tissues of low organization, and in connective tissue it is often difficult to determine whether a part lives or not.

The activities, which (like the totality of life with Brown) may be called forth by an external influence, are either functional, nutritive or formative. The boundaries of these processes, indeed, shade away into each other, but yet in the internal changes which the irritated part suffers, they are very different. "The result of an excitation or an irritation may be, according to circumstances, simply a functional process, or the institution of a stronger or weaker nutrition of the part, without necessary excitement of its function, or the establishment of a formative process, which creates more or less new elements." The function of every activity suffers fatigue, which need not always be removed primarily by nutrition, but may be dissipated by simple rest and restitution.

By nutritive irritability we understand "that faculty of individual parts, which leads them under the influence of definite irritations to take up and transform within themselves more or less material." To this are united the formative changes, which begin with division of the germ and are continued in the new formation of the elements.

In the doctrine of new formations Virchow rejects the theory of the blastema, of the plastic lymph of older writers, as well as that of exudation. Instead of these he assumes a continual development upon soil already existing, and regards the connective tissue, with its equivalents, as the common germinative trunk of the body. From this, in the vast majority of cases, he thinks that neoplasms take their origin. The process of new formation consists in either simple division of the cells or germs (and the development of physalides), in which the new elements correspond with those of the mother soil — what we commonly designate as hypertrophies or better hyperplasiæ — or in a very rapid division into smaller and smaller elements, which occasionally become so small at last that they fairly reach the limit of cells. "The proliferation of the cells may cease at this point; the individual elements then begin to grow again, to increase in size and, under certain circumstances a form may by produced again here, quite analogous to that from which the development proceeded." Yet ordinarily this is not the case. As a rule the young, minute elements strike out a somewhat different course of development, and there begins a "heterologous plastic development", which has always a destructive character, besides that of contagion in continuity. This development extends to the neighboring and anastomosing tissues, without any intervention of vessels and nerves, though these latter, from the softness of their interstitial substance, often furnish "the best conductors for the propagation of contagious neoplasms". From just such considerations the value of the cellular theory, or the theory of anastomosing elements of the tissue, becomes clear. For it is not established whether infectious materials or cells from the focus of disease are transported by way of the plasma, through the blood, to remote places. The heterologous neoplasms are parasites in the sense that they are as well "destructive in the beginning as spoliative in their course". In deciding whether a form is to be considered physiological or specific, nothing determines the question save the abnormal locality in which it is found, and the existence of a fluid, which, conveyed to neighboring parts, produces in them a contagious and unfavorable effect.

As regards tuberculosis, Virchow (following the theory of Reinhardt, who distinguished a genuinely neoplastic form, and an inflammatory form in which no tubercle exists) accepts a genuine tuberculosis and a caseous pneumonia, which may become tuberculous. In agreement with Malassez, he regards the formation of nodules as the characteristic of the process. Recently, however, Virchow accepts the existence of a bacillary and a non-bacillary form of tuberculosis.

As Virchow himself intimated, the preceding theory, subsequently expanded in its details and modified in a few points, tended to oppose from the outset the current views, and particularly those of Rokitansky and the Vienna school, which chiefly cultivated gross pathological anatomy and effected the domination of this branch in medicine. Now microscopic anatomy or microscopic pathological anatomy was destined to occupy the place of the latter. Still more did Virchow's theory antagonize the systems of rational and physiological medicine, for he declared it necessary "to rise by independent experience, empirical observation and investigation, to a pathological physiology, i. e. a physiology which teaches the course of vital phenomena under pathological conditions." The first object was undoubtedly attained. In this sense we might speak of a Berlin school of micro-pathological anatomy.[1] The rôle of the chemical crases of the Vienna school was now taken by the morphological crases, and to this doctrine vitalistic views (those of Haller and Brown) were added.

The cellular theory, like all theories, is to be regarded as an historical expression of the scientific tendency of a certain period ; as a theory whose proper fundamental ideas must be considered only as partially new, and whose duration too, as a whole, is, like that of all theories, limited. Many important points of this theory have already become obsolete in consequence of more recent microscopic interpretations, which, as we all know, always and everywhere undergo rapid changes. Yet undoubtedly, in common with few other earlier theories, it enjoys the enduring excellence that no theoretic system of therapeutics has been built upon it[1] by its author, and that in his hands it continues to be what it was originally intended to be — a scientific theory.

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[1] How great honor was paid to investigations in microscopic anatomy may be inferred from a satirical expression of Karl Vogt: "If I succeed in inventing a specific method of hardening or coloring specimens, which permits 500 sections to be made out of a piece from which heretofore only one hundred could be made, I have as good a claim to promotion in university matters as a useful subaltern has to the civil service." (Psysiologische Forschungen am Meer, 1881).

Virchow, like Roeschlaub (whose general views he adopts in many points), defines disease, one of whose chief characteristics is "danger", as "one of the possible phenomena under which the life of individual organized bodies may manifest itself. The sole ground of all phenomena, healthy as well as morbid, is only life itself, and a disease detached from other life, existing beside it, and being for itself, has no existence. What we call disease is a mere abstraction. Life is cellular activity (?), and the cell is not the simple vessel of life, it is itself the living part. Life is something given, something rendered possible by inheritance only, and therefore, besides the forces permanently united to matter, there must be given a permeating force which is transmitted mechanically (?) from member to member. Whence this force took its origin experience has not yet divined, but this deficiency does not warrant us in denying its existence. Accordingly we distinguish in the living body two kinds of forces: the molecular forces and the exciting and excited vital force, by the combined action of which in the individual, organic elements, the elementary or cell forces, which we are in the habit of regarding as vital force in the wider sense of the term, are brought into action" — a definition which in importance and precision has no advantage over those of an earlier date. The continuance of life is ascribed (as by Brown) to a succession of permanent external influences, the vital stimuli, which always keep awake "the tension of the solid particles." "The unity of the living body is founded only in the dependence of its living parts upon each other, a dependence accomplished by means of the nerves, the circulation and immediate anastomoses or contacts. . . . . The vital force is regenerated from the molecular forces in the process of nutrition. No vis medicatrix naturæ exists as a special reserve force, and the cures of nature are not generally different from those of art. The latter rather avail themselves of the existing physiological arrangements and forces of the body, in order by the artificial induction of more favorable conditions to bring about, if possible, an adjustment of the disturbances." "The task of the physician is to weaken or destroy the predispositions, and to facilitate the adjustment of disturbances once begun."

As regards the practical bearing of these abstractions, in which Virchow, instead of striving after originality in his definitions, relies chiefly and intentionally upon definitions already existing — yet he frequently employs new words for old ideas — we must finally quote the following remark :

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[1] It was done, however, by Dr. Schüssler, in his "Abgekürzte Therapie, gegründet auf Histologie und Cellularpathologie". Dr. C. H. Schauenburg (died 1876) went still further, inasmuch as he called Baunscheidtism, i. e. the acupuncture of the Chinese and Japanese, modified and turned to profit by the turner C. Baunscheidt (died 1860 in Endenich near Bonn), a genuine "Cellulartherapie".

"Such abstractions are necessary in explaining a theory and in the use of language, for by them alone can mutual understanding be accomplished. In practice, however, in the comprehension of the individual case, they must be abandoned, since they are attended with the danger of leading one to lose sight of the patient in the disease, the reality in the idea. The patient alone is the object of medical activity, and the physician must never forget that his ultimate aim is one of humanity."

The life of Virchow is distinguished from that of the modern German university teacher by the fact that he attained very early the highest grade in the career of the learned. to wit the professorship. After studying in Berlin from 1839 to 1843 at the Pepinière, he presented for his doctor's degree the dissertation "De rheumate, præsertim corneæ." He was then appointed assistant physician in the Charité hospital, where he subsequently became prosector and privatdocent. Although ordered by the government to Silesia in 1847 as an expert for the investigation of the causes and means of getting rid of an epidemic of famine typhus, he soon became a political irreconcilable in Berlin, and therefore settled as a professor in Würzburg in 1849. Here he found a reception when there was no place for him in North Germany. For the second time he was sent from here in 1852 into the Spessart, to investigate an epidemic of famine typhus. But as early as 1856 he returned to Berlin to assume the chair of pathological anatomy, in which he introduced the subject of microscopic anatomy, to which Rokitansky had given insufficient attention, and thus gave to his chair a new direction. Three years later, at the request of the Swedish government, Virchow went to Norway to study the leprosy. — That Virchow plays a prominent part, not only as a medical theorist, but (like many German professors since the "Demagogenzeit") as a firm but stubborn man of advanced ideas in the Prussian House of Deputies, is well known. A pupil of the great physiologist and pathological anatomist Johannes Müller (1801–1858, Handbuch der Physiologie des Menschen, 1835) and of Schönlein, for each of whom he delivered a memorial address, Virchow developed a great capacity for work and singular versatility as a teacher, investigator savant and popular writer, as well as a political deputy — in this capacity he originated the term "Culturkampf" — and recently as a hygienist and anthropologist or archæologist. He professes to be a great admirer of Harvey, whose picture is the only one permitted to hang in his study. Among his numerous works we may mention the "Cellularpathologie" (1st edition 1858, 4th edition 1871), translated into French by Picard and into English by Frank Chase (1860); Gesammelte Abhandlungen 1856–1862; Virchow's Handbuch der speciellen Pathologie und Therapie, 1854; Archiv für pathologische Anatomie, Physiologie und klinisbe Medicin; Canstatt's Jahresbericht (continued); Mittheilungen über die in Oberschlesien herrschende Typhusepidemie, 1848; Id. im Spessart, 1852; Einheitsbestrebungen in der Medicin, 1849; Pathologie der Geschwülste, 1866, translated into French by Aronssohn; Lehre von den Trichinen, 1875, etc. In his treatise on tumors Virchow carries out the division of these growths originally adopted by Joh. Müller in 1838, and which classifies them according to their microscopic elements. Virchow, however, studied the subject and named tumors in accordance with the results of more recent investigations and views, particularly his own. While, however, Müller, according to Fleischmann, declared the ideas heterologous and homologous inadmissible as regards tumors, Virchow adopts again these terms, but understands by heterologous tumors, those which contain tissues different from those of the locality in which they are developed, and by homologous, those whose tissues are similar to those of their locality.

Virchow has had among his pupils a great number of notable professors and physicians. We may notice among these: E. Leyden (born 1832), formerly in Strassburg, now in Berlin; Fried. Dan. von Recklinghausen (born 1833), professor in Strassburg; Julius Cohnheim (1839–1884) of Demmin in Pomerania, professor of pathological anatomy in Leipsic and author of valuable investigations on inflammation and the embolic processes, as well as the first inoculator of tubercle in Germany. Cohnheim in 1867, by his discovery of the diapedesis of the white, membraneless blood- or plasma-corpuscles through pores in the uninjured walls of the vessels during the process of suppuration, damaged decidedly the cellular pathology of his teacher, who believed that pus was derived from the cells of the connective tissue.[1] H. W. Gottfried Waldeyer, professor in Berlin; Felix Hoppe-Seyler (Handbuch der physiologisch-chemischen Analyse, 1858), professor in Strassburg; W. Kühne, professor in Heidelberg, author of papers on the "retina-purple" (1877), discovered by Franz Boll in Rome. Kühne proved it to be a photo-chemical portion of the retina. Georg Eduard Rindfleisch, professor in Würzburg; E. Klebs (Handbuch der pathologischen Histologie), professor in Zürich and the champion of the germ theory of disease; Liebreich; Anton Biermer, the discoverer of progressive pernicious anæmia; Georg A. Lücke; Vic. Friedreich (1825–1882) in Heidelberg, author of works on diseases of the heart, on physical diagnosis, muscular atrophy etc.; Alexander Diesterweg, who wrote a cellular physiology and has demonstrated how far theoretical considerations can be carried; and many others. All of these men are microscopic and pathological anatomists of the first rank.

Finally we must direct attention to one of the results of Virchow's theory, a school to which the present popularity and general recognition of German medicine abroad was first due. We refer to the German so-called

SCHOOL (OR MEDICINE) OF THE NATURAL SCIENCES,

of which Virchow is the intellectual father. This school seeks, chiefly by means of pathological anatomy and microscopy, experimental physiology and pathology and the natural sciences, or rather by their methods, to render medicine also an "exact" science. "Medicine as an applied science thrives only in the broad field of the natural sciences in general" (Virchow) is the creed of this school.

To it belong, with the characteristic predominance of "exact" clinical investigation, those representatives who unite in maintaining the "Deutsche Archiv für klinische Medicin". At their head stand the Munich clinician Hugo von Ziemssen, and the pathological anatomist of Erlangen, F. A.

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[1] M. H. Dutrochet too in 1824 had observed the diapedesis of the bloodcorpuscles (not simply of the white corpuscles) in the larva of the toad, and regarded it as important in nutrition.

Zenker, the former (after Virchow's example) the editor of a voluminous cyclopædia of pathology. Indeed this form of publication is characteristic of the literary productions of the school of the natural sciences, the individual sections being discussed by specialists in each department. The school of natural history, on the other hand, pursued a different system, in which voluminous text-books were written by a single author, while in the New Vienna School almost all the important teachers wrote each a single special work in his own department. Among the physicians of the school of the natural sciences we may notice: A. Geiger in Würzburg; C. Gerhardt, formerly in Würzburg, now in Berlin, who likewise edited a cyclopædia of the diseases of children; W. Ebstein in Göttingen; H. Nothnagel, formerly in Jena, now in Vienna; Th. H. Jürgensen and C. Liebermeister in Tübingen; A. Biermer, formerly in Zürich, now in Breslau; Mannkopf in Marburg; Th. Weber in Halle; O. Heubner in Leipsic; H. Senator in Berlin; Franz Obernier (died 1882) in Bonn; Lichtheim in Bern; G. Merkel in Nuremberg; W. Erb in Heidelberg; A. Vogel in Dorpat, author of a text-book of the diseases of children which has enjoyed numerous editions (a new one recently under the direction of Phil. Biedert in Hagenau); C. Bartels (1811–1878) in Kiel; H. Rühle in Bonn; O. W. Leube, formerly in Erlangen, now in Würzburg etc. etc.

A branch of the school of pathological anatomy and the natural sciences, combining therewith a tendency to etiology and hygiene, is the Munich clinical school of the natural sciences and hygiene. To it belong among others: Ludwig von Buhl (1816–1880), who introduced pathological anatomy into Munich; Franz Xaver von Gietl (born 1803); Jos. von Lindwurm (1824–1874); von Pettenkofer, Buchner, Franz Seitz, Jos. Bauer, H. von Böck, Max Joseph Oertel, Krieger in Strassburg etc.

While with the physicians already mentioned the subject of hygiene occupies the second place, in the school of the natural sciences and hygiene it advances to the front. In this school we must reckon those physicians who belong to the "Verein für öffentliche Gesundheitspflege", among whom we may mention: Georg Varrentrapp and Alex. Spiess in Frankfort; Karl Reclam (1821–1887), professor in Leipsic, a hygienist and propagandist of cremation in Germany and a popular hygienic writer; L. Hirt in Breslau; A. W. Hofmann in Leipsic; Göttisheim in Basel; Roth in Dresden; Fr. Sander (1835–1878) in Hamburg; Märklin in Wiesbaden; Sonderegger in St. Gall etc. As in this school the element of practitioners counterpoises that of university professors, it is to be hoped that through its influence the seed may be sown for a combination of investigation and practice similar to that of English medicine.

The splitting up of medicine into specialties, and the increase of its subordinate branches in the school of the natural sciences, resulted in danger to the unity of medical science. A return to the method which combines science and practice, the clinico-practical method, is again sought by the "Zeitschrift für klinische Medicin" under the management of Fr. Th. von Frerichs (1819–1885) and E. Leyden. "Medicine in our day seems threatened with being cast too deeply in the shade, both in its life and its literature, by the subordinate branches. It seems here and there to be forgotten that medicine is the alma mater, that from it all the subordinate branches derived their origin, that the latter without medicine are incapable of any permanent growth. It seems to be entirely forgotten that in the department of medicine is treated the greatest part of the questions which occupy our care and our thoughts daily and hourly at the bedside. Medicine is not a part of the science of healing, it is the very heart of that science, and this heart should not be hidden and covered up by simple outworks. German medicine too has a right to a special representation, for it stands upon its own feet. It is independent, and therefore self-conscious; it does not sail in the navigable waters of foreign nations. It was an error, weighty and pregnant with disaster to German medicine, when Rokitansky in 1846 expressed the conviction that pathological anatomy must be the foundation not only of professional science but also of professional treatment. . . . . Therapeutics needs for us physicians a special study, for it is the end and object of our proper labor" (Frerichs).

Frerichs was born in Aurich and studied from 1838 in Göttingen and Berlin under Schoenlein and Dieffenbach. In 1842 he settled down to practice in his native city, but in the following year went again to Prague and Vienna, and in 1846 to France, Holland and Belgium, and finally settled in Göttingen as a privatdocent. In 1850 he was called to Kiel, served as a physician in the Schleswig-Holstein war, went then in 1851 to Breslau as a professor, and in 1859 became Schoenlein's successor in Berlin. His call to Breslau was due to the recommendation of Stromeyer, and he was the first professor in Breslau to employ the German language in his lectures (1851). His chief works are: "Klinik der Leberkrankheiten", 1859-1862, which received the Monthyon prize of the Paris Académie; "Bright'sche Nierenkrankheit und deren Behandlung", 1881; "Ueber die menschliche Galle", 1845; Ueber die chemische Zusammensetzung der Galle", 1841; "Ueber Staphylom der Hornhaut", 1847, etc., etc. in Journals. In Wagner's "Handworterbuch der Physiologie" he wrote the article on "Digestion". "Ueber Diabetes" was his last work and was never finished. — As a practitioner Frerichs was very popular, and acquired a fortune of millions.

Under the title of

o. Seminalism or Seminal Vitalism,

the exceedingly diligent, versatile and eloquent professor E. Bouchut of Paris has recently published a theory which advances the claim that it does not leave out of view the benefit of the sick, for whom (?) systems of medicine are created; indeed, that it grants nothing to hypothesis, but everything to observation. It is at all events a characteristic fact that this newest French theory is again a vitalistic theory, so that it seems as if vitalism alone was privileged in France, since the French have of themselves brought forward scarcely any other than vitalistic theories, or adopted them in a modified form always from other people. Thus they followed Paracelsus, the Iatro-chemists, in a less degree the Iatro-mechanics and others. Bordeu and Barthez in the last century created the first French theory, which was, as we have seen, a vitalistic theory. This theory was followed by Bichat, from whom Bouchut, as a matter of fact, borrowed much of his system. The doctrines of Broussais stand in close relation at least to vitalism.

Let us see how far the above programme, surprising for a theory, is carried out. Bouchut teaches:

Beasts have an intelligence of instinct, man that of abstraction. No beast oversteps the limits of animal thought, which is separated by an abyss from the productive thought of man. This division of Moquin Tandon and de Quatrefages, instituted on the assumption of the four kingdoms of nature — the mineral, vegetable, animal and the kingdom of man — is a justifiable one.

"Either there are simply differences in grade between minerals, vegetables, beasts and man (who, according to the realistic theory of Lamarck and Darwin, is merely an improved ape), or the four kingdoms are separated by impassable barriers. In the first case man is the highest of the apes: in the second, the abyss of the intellect separates him from the beast. Man, however, does not change his constitution. To this is added the moral, intellectual and industrial perfectibility of man . . . . . from the stone age down through the iron age to the present day. . . . . Is that animal instinct or ever changing fancy, which springs from the love of the useful, the good and the beautiful? The beautiful, the good and the true in the foundation of human consciousness, and with these ideas those of a metaphysical cause of the harmony of the worlds under one form or another, this it is, which Quatrefages has called religiousness."

There is also a proper kingdom of man in accordance with his spiritual nature. On the other hand, by his physical constitution, "through the vital or seminal force, which imparts to his germ the specific, individual impulse through the 'impressibility' of all his molecular elements, through the condition of the living humors from which he originates, and through the conformation of his solid parts, he approximates to animality."

Through the vital or seminal force these molecular elements composing the organs and tissues *feel* — the first expression of life, which begins without definite structure, without nerves and without contractile fibres — in their way, and *move*, in order to form the parts, in which through their own determination they must take their place. Their attributes are distinct from the organization which they are called upon to create. They are the attributes of life, not those of a living being. They are called: Impressibility, i. e. sensibility without nerves; Autocinesis, i. e. motion without definite, contractile fibres, and Promorphosis, or foreknowledge of the organic forms to be created. Among them impressibility assumes the first rank. Upon the impressibility of the seminal or vital force life is dependent. This same force causes life in beings which have no nerves, like the infusoria, and maintains it in the anatomical, nerveless elements of the tissues, of the blood, of parts in which the nerves have been divided, and finally even after death in certain molecular elements, which on account of this impressibility continue to live.

Impression and reaction are the first and last expressions of life, they condition the latter, and when they cease life also ends.

"Diseases are changed impressions, that is true, and upon this aphorism is based the medical doctrine to which for several years I have owned allegiance" says Bouchut, though without the slightest proof that he here makes no concessions to hypothesis, as he pretends. The doctrine is not even a genuine hypothesis, but an entirely arbitrary assumption. It is also distinguished from Sensitism, according to Bouchut, by the fact that it asserts sensibility without nerves — certainly something new for the present day — and approximates closely to the theory of Glisson and Bichat of an insensible or unconscious sensibility. It represents the application of the fact (?) of a seminal force to physiology and pathology, to that which in the living molecules produces sensibility without nerves. This is "Seminalism" which, as we see, amounts to a new word.

By the fecundation of the ovum the unconscious sensibility of the molecular elements is created with the aid of the male vital force, which, known of all men, is deposited as something substantial in the semen, and meets that of the female ovum. This sensibility unites the elements with each other and groups them in definite form, through a vital affinity, necessary for the configuration of the tissues and organs. "Without this obscure characteristic that they — the elements — feel, they could neither unite by choice, nor combine in the order required by the life of the species." If, however, the unconscious sensibility exists only in part and is but partially developed, the development of a new being in the ovum at the place where this deficiency exists is imperfect, an organ drops out in this place or is modified in form, and thus deformities arise. If the unconscious sensibility is diseased or morbidly disposed, so also are the molecular movements of the ovum, and from the grouping of the elements thus arising the preparation for innate or hereditary diseases in the future germ originates. To the special individual character of the unconscious sensibility, generated in the ovum by the vital force, must, however, be ascribed that special affinity — a genuine physiological and a specific affinity — of the ultimate anatomical elements, from which spring the differences in individuals of the same species and race, the varieties, the similarity to father and mother, the great or little growth, the color of the hair and beard, longevity, the idiosyncrasies etc. All this is modified by sexual intercourse, which mingles two different seminal forces, and combines them in such a way that the impressibility of the new being is produced. It is also modified by climate, which weakens the seminal forces; by custom; by civilization. — In the body of the adult the unconscious sensibility is found in parts which have no nerves, and in the anatomical elements of the fluids and tissues which are uninterruptedly renewed; but here it is of less importance than in the ovum and the embryo. It acts now together with the unconscious sensibility of the sympathetic nerves, which comes from it, and with the conscious sensibility of the ordinary nerves. It occasions the generation and the continuance of the constituent anatomical elements, which are directed by the vital affinity. The second by mutual and general sympathy occasions the consensus among the tissues, and the third finally brings about the consciousness of the agreeable or dangerous relations of the individual to the outer world. "If the case stands as these considerations and experience prove" (though Bouchut fails to give us any actual proof), "everyone will understand that the metamorphosis of the ovum into the embryo and of the embryo into the adult being, and then the maintenance of life through its activity in the constituent elements and its influence upon the life of the whole, must be ascribed to the presence of a vital force and its impressibility."

The vital force of man and that of beasts are entirely different from each other, and the artificial experiments concerning the latter prove nothing as regards man. The vital force of beasts never produces a man, and conversely.

The separation of the vital force from the organism and the parts of the organism is a mere abstraction. Since, however, this force effects the formation of the special organs, tissues and powers of the organism, as well as their continual nutrition and renewal, we must also take into account the special peculiarities of the tissues and organs themselves.

"The body is continually changing, that is true, and as David says, what was yesterday is not the same as what is to-day, nor that which will be to-morrow."

But the principle of physical identity remains in the body, since the constantly renewed mass is formed in exact accordance with the original plan of the seminal force and its impressibility. In all the changes of his elements man is a being identical with himself. "Although now life is one, yet as regards its functions it is manifold; for the blood causes life, as well as the circulation which moves the blood forward, the respiration which vivifies it, the innervation which imparts to the tissues their tone and necessary contractility. All this is a part of the human mechanism." If the respiration ceases, the blood, no longer supplied with oxygen, becomes an actual poison to the organs, and death ensues in accordance with chemical laws. If any considerable portion of the brain is destroyed, muscular contractility is extinguished, and, in consequence of the inactivity of the important organs, death may ensue mechanically. If the heart stands still, death results from the stopping of a part of the wheel-work of the human mechanism, which we must therefore study in order to allot to the vital force the correct rôle in pathology.

Bouchut's idea, expressed in 1867, "Impression and reaction, this is the most abstract formula of etiology, for diseases are nothing but altered impressions", Virchow, as Bouchut declares, adopted. In this point the views of Virchow certainly coincide pretty clearly with those of Bouchut, except that Virchow falsely assumes three varieties of irritation, the functional, nutritive and formative, to which are added the passive processes, since functional and nutritive irritation are the same. While, however, Virchow takes the cell as the starting-point of his speculations, although it is not the first element, Bouchut selected a higher stand-point, as he says, when he adopted the disturbances of the impressibility of the molecular elements or of the vital force as the starting-point of his pathology — and thus, as he gives us to understand, made no concessions to hypothesis.

All internal and external causes of disease modify more or less the vital force and its impressibility in the fluids or at some point of the economy; they increase or weaken that impressibility; and from these two conditions the seeds of disease, and (when the impression is a curative one) the means of its cure also, originate.

"In pathogeny the increase of the impressibility of the constituent elements acts upon the tissues and calls forth, according to its nature, hyperæmia, inflammation with its sero-fibrinous, epithelial or purulent exudations, certain active hæmorrhages, serous or gaseous evacuations, hypertrophies of the elements and various tissues which form the skeleton of the organs, the pyrexiæ, with their alterations in the humors, which on their part become causes of disease" etc.

Together with such disturbances arise the sympathetic reflexes, such as: fever, lassitude, want of appetite, gastric impurities, with or without vomiting etc.

Through this increase of the impressibility, and in accordance with the organ affected, arise the functional disturbances, the physico-chemical effects of gravity, of endosmotic absorption, of erosion of the tissues, to wit: almost always pain, due to the participation in the process of the ordinary nerves; in the brain and the meninges, delirium, somnolence, vomiting, slowing of the pulse, convulsions and paralysis; in the pharynx, dysphagia; in the bronchia and lungs, cough, the various kinds of expectoration and dyspnœa; in the intestines, diarrhœa, dyspepsia and boulimia; in the kidneys, changes in the urinary secretion; in the vessels, embolisms with their results, the absorption of the more or less poisonous morbid matters of wounds; cramps in the hyperæmic or anæmic nerves; in fevers, the alterations in the humors, which produce other secondary disturbances and reproduce the germ of the evil, and finally the physical effects of gravity, of absorption through endosmosis, of obstruction by morbid matters, of erosion through the acrid character of the evacuations etc.

From diminution of the impressibility arise: atrophy, softening, fatty degeneration of the elements and tissues, certain passive hæmorrhages, certain atonic congestions, which are likewise accompanied by sympathetic reflex phenomena, all attended with local and more or less pronounced disturbances of function.

The local diseases arising from an increase or diminution of the impressibility become generalized by endosmotic or capillary absorption, since they call forth an alteration in the blood, or, while they remain local indeed, they yet, through the medium of the reflex action of the great sympathetic nerve and directly through the ordinary nerves, affect the whole economy of the body.

All this is demonstrated by experience and observation.

"I will accept as experience the new theory of pus-formation set forth by Virchow's pupil Cohnheim, and so contradictory to that of his master." According to this theory a suppuration arises in irritated but nerveless structures through a diapedesis of the white blood-corpuscles. By means of amœboid movements, i. e. movements originating without known contractile organs, the leucocytes press between the epithelial lamellæ and form a focus of suppuration, "whose epithelial cells and their elements have felt something which has not reached the consciousness of the subject. Yet the leucocytes themselves, since they change form and place, have manifested a sensibility unperceived by us, and this suffices to demonstrate experimentally the fact that the impressibility called into play is, in some way or another, the cause of the inflammation of the tissue" — a conclusion which certainly lacks nothing in boldness, while, by a rash as well as surprising turn which seems characteristic of Bouchut, it skips over a whole row of intermediate steps otherwise necessary to form a logical method.

Bouchut now enumerates the individual diseases originating in alterations in the impressibility.

From an excessive impressibility of the vital force arise:

"Meningitis, cerebritis, coryza, otitis, diseases of the eyes, pharyngitis, tonsillitis, laryngitis, bronchitis, pneumonitis, pleuritis, endopericarditis, gastritis, enteritis, dysentery, acute hepatitis and nephritis, adenitis, phlebitis, rose, gout, osteochondritis, periostitis and all primitive inflammations of the various tissues; all active congestions of the lungs, liver, kidneys, brain and spleen; globular plethora, hæmitis; active hæmorrhages of the brain without primary injury of the capillaries; certain hæmorrhages from the nose, lungs, intestines, kidneys etc.; certain catarrhs of the nose, bronchia, stomach and intestine; the flatulence of hysteria and inflammatory dyspepsia; the hypertrophies of the cellular and fibrous tissues, of the epithelial, adipose, glandular, pigmentary, cutaneous or mucous tissues etc.; certain acute diseases of the skin dependent upon a predisposition of the vital force; eruptive fevers, from which the exanthem ordinarily springs etc.; diabetes, which irritation of the fourth ventricle calls forth, as well as contusions of the occiput and senile weakness."

From diminution of the impressibility arise:

"Grave jaundice, albuminous nephritis, amyloid liver, fatty degeneration of the constituent elements, the so-called caseous, ulcerative inflammations of the lungs, fatty adenitis, phymatoid troubles; all tuberculous affections of the meninges, the brain, the pleura, lungs, liver, intestine, peritoneum, the bronchial or mesenteric glands, the bones etc ; certain passive congestions of the lungs in fevers and severe diseases, or resulting from the acute stage of bronchopneumonia ; certain passive hæmorrhages depending upon destruction of the blood in fevers or in scurvy, or resulting from fatty degeneration of the capillaries and vessels, or obstacles in the vascular apparatus occasioned by ulcerations of the vascular tissue at a certain point, etc.; softening of the tissues, especially of the bones caused by rhachitis, softening of the brain, genuine molecular gangrene, which prepares the way for cerebral hæmorrhages and paralyses, etc.; partial or general atrophy of the constituent elements of the tissues, atrophy of the organs or of the morbid products of by-gone, chronic inflammations ; catarrhal discharges in chronic inflammations of the mucous membranes, certain glandular discharges and the chronic effusions of the serous membranes ; certain diseases of the blood characterized by an excess of its watery element, diminution of the number of its red corpuscles, increase of the white corpuscles, decrease in the proportion of albumen, all of which occasion congestive and ischæmic neuroses, certain forms of hysteria and hypochondria, and finally all forms of nervousness."

Diseases caused by an excessive impressibility of the vital force, followed by a diminution of this impressibility are :

Caseous pneumonia after ordinary inflammation, chronic congestion of the liver after acute inflammation, obstruction after inflammation of the intestine, atrophy of the kidneys after nephritis etc.; gall-stones, salivary concretions, renal calculi; exudations which give rise to adhesions, obstructions of the veins after phlebitis, embolisms after endocarditis etc.; anæmia, hydræmia, leucocytosis, gout, scrofula, syphilis etc.

From anomalies of the impressibility arise the mental or moral diseases.

Therapeutic actions are merely altered impressions. Remedies excite or diminish the impressibility of the elements or the tissues, and in this way the vital force produces reaction and reflex acts, both of which give rise to curative effects.

Under the title of remedies which alter the impressibility Bouchut employs alcohol, wine, iron, manganese, cinchona, arsenic in small doses, the bitter, stimulating and aromatic etc. remedies, which show themselves most useful in the cachexiæ, in herpetic, cancerous and tuberculous lesions, and in certain alterations of the humors in fevers. Cold water, sea and river bathing for a short period, exercise, amusements, travelling, baths in compressed or rarefied air, inhalations of oxygen and an exclusive meat diet belong also in this class.

Stimulants, increasing the diminished impressibility are: cathartics and especially the salts of soda in certain mucous fluxes or gaseous formations in the intestine; then the carminatives with their odoriferous principle and the ethereal oils, which cure certain forms of diarrhœa or flatulence. The same indications are fulfilled in catarrhal conjunctivitis, mucous discharges of the urethra and vagina etc. by nitrate of silver and the milder caustics, and by the balsamic remedies in catarrhal troubles of the bladder, the bronchia and the urethra.

Local excitation of the impressibility is produced by the revulsive plasters in certain atonic dropsies, by inunctions of iodine, as well as by nitrate of silver in the eye, warm alcohol in the tunica vaginalis testis etc.

The weakened impressibility is excited in the following "beautiful" example: "We have before us a beautiful case of adynamic scarlet fever, almost fatal and accompanied with delirium. We now endeavor to diminish the impressibility by cold ablutions, while the temperature is 40–41 C., the pulse up to 160 and the eruption crimson in color. In two hours the temperature becomes lower, the pulse is slower and the fading eruption pursues its course to convalescence."

Leeches and venesection diminish the impressibility. Digitalis, veratria and bryonia prove similarly curative in acute internal inflammations.

The impressibility of the constituent elements themselves, however, is diminished by antimony, emetics, mercury and iodide of potassium.

Emetics employed to remove a foreign body from the larynx and bronchia, cathartics administered to remove fæcal collections impacted in the intestine, riding and artificial respiration after the cure of pleuritis, and similar procedures are impressions upon the vital force called forth by the physician for the purpose of curing his patient.

"Finally we must place in this class the chemical and surgical means employed by the physician to destroy worms or vegetable parasites, to dissolve renal and vesical calculi and gall-stones etc. The disturbances of the impressibility were concerned in the alterations of the humors and organs, in the changes which the calculi etc. occasion, and which became a source of danger to the whole of the viscera. All efforts, however, to cure them by dynamic means would be ridiculous. The treatment here is the business of chemistry and surgery."

The preceding theory, chronologically the last but one of our century — it was published in 1873 – so far as general medicine is concerned, manifestly, in abstraction of its premises and the boldness of its conclusions, yields to none of its predecessors — proof enough that even in exact France Bichat's programme of transforming medicine into a natural science is far from accomplished.

p. The Modern Parasitic or Germ Theory.[1]

The birth of the idea of the parasitic origin of diseases very shortly after the invention of the microscope we have already had occasion to notice, and we have recorded[2] in their proper place the older facts and views upon this subject. We will here, however, emphasize once more the fact that at that time microscopic animals (animalcula, subsequently called infusoria) were regarded as the agents of infection, while at the present day the lowest order of plants is believed to be the infecting material.

The development of the modern parasitic theory stands in the closest relation with that of the doctrines of the generatio æquivoca, putrefaction and fermentation, miasm and contagion, in general of the causes of disease included in experimental pathology. We can sketch here only the chief features of this development, and, indeed, these only so far as the questions seem to be tolerably well settled.

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[1] Consult C. Gussenbauer: "Septhämie, Pyohämie und Pyo-Septhämie", 1882; E. Ziegler "Lehrbuch der allg. path. Anatomie", 4th ed., 1886; Fr. Loeffler "Vorlesungen über die geschichtliche Entwicklung der Lehre von den Bacterien", 1887; Naegeli "Die niederen Pilze", 1877; G. Marpmann "Die Spaltpilze" etc., 1884; the reviews in Canstatt and Schmidt's "Jahresberichten" for the last few years etc.

[2] See under Leeuwenhoeck, Kircher, Lange etc., and also O. F. Muller. The latter introduced the terms, vibrio, bacillus, monas, termo. Those of bacterium and spirochæta we owe to Ehrenberg. Herm. Hoffmann, professor of botany in Giessen, distinguished the bacteria from the micrococci even in name, in opposition to Hallier, who regarded bacteria as grades of development of micrococci.

Ehrenberg still regarded the "infusoria" (1838) as animals. On the other hand, Felix Dujardin (1841) had some doubts as to the correctness of this idea, and Maximilian Perty, as early as 1852, affirmed that most of the forms classified as infusoria might with equal justice be assigned to the vegetable kingdom. Naegeli then assigned them to this kingdom (schizomyceten), and Ferd. Jul. Cohn completed the proof of their vegetable nature and perfected the classification of the lowest forms of vegetable life.

In the development of the germ theory of diseases the French and Germans were the most prominent workers, though the English, Americans, Italians etc. also took a share in the discussion. The investigation began in the twenties, but assumed its present direction in the third and fourth decennia of the present century.

The experiments of Haller (the creator of experimental pathology) were renewed by M. H. B. Gaspard (1788–1871) in 1822. Gaspard, however, injected into the veins of animals not simply putrescent matters, but also the blood of other animals suffering from the effects of such injections. — A special impulse to the theory of parasitism was given, however, by Bassi's discovery (1835) of the cause of the disease of the silkworm, quickly succeeded by the proof of the existence of both animal and vegetable exciters of disease. Schoenlein demonstrated (1839) the fungus of favus, and Remak subsequently produced the disease experimentally. Donné advanced the view (1837) that "vibriones" were the cause of syphilis. Renucci (1834) again taught us how to find the itch-mite, and Krämer showed the male animal, though Hebra was the earliest unconditional defender of Wichmann's idea of the etiology of the disease. J. Vogel discovered the oïdium albicans (1840), H. D. S. and John Goodsir the sarcina ventriculi (1841), C. F. Eichstedt the fungus of pityriasis versicolor, Malmsten and Gruby that of herpes tondens etc. The weightiest influence upon the development of the germ theory was exercised, however, by Davaine's discovery of the bacillus anthracis (Communication faite à la Société de Biologie, 1850) and his experiments in inoculation, and the investigations of Pollender and Branell, published at a later period.[1]

The modern theory of the production of diseases through infection found further powerful support in the investigations relative to the essence of the processes of fermentation and putrefaction, with which the processes of disease were at once compared. Cagniard Latour and Schwann in the same year (1837) proved that the yeast cells, which were known even to Leeuwenhoeck, were actual vegetable forms, capable of growth, and Ludwig Boehm, a year later, showed their existence in the stools of cholera — an accidental discovery which led to the conjecture that the process of fermentation was also concerned in the causation of that disease. One year earlier (1836) Franz Schulze produced the far more important proof that the fermentation of fluids could occur only in the presence of extremely minute vegetable organisms, which existed everywhere in the air; that when air was entirely excluded, or admitted only through sulphuric acid, or after preceding heating or filtration through pure cotton (H. Schroeder and Th. von Dusch),[1] the process of fermentation did not take place. — Chevreul and Pasteur then proved that animal solids also continued free from decomposition and putrefaction when protected from the access of germs. That in those cases, however, where, in spite of all precautions to prevent the entrance of germs, fermentation and putrefaction still occurred, there existed "Dauerformen" (permanent forms), destructible only by moist heat (steam), was shown by Jul. Ferd. Cohn. Pasteur then demonstrated (1857 and later) that fermentation and putrefaction were caused, not by chemical "ferments" (Liebig), but simply by the vital processes of lower organisms. The latter he divided into those which work only in the presence of oxygen — aérobes — and do not subsequently die, and others which work without oxygen — anaérobes — and after action perish. Pasteur also assumed specific forms of organisms for each variety of fermentation and putrefaction, and thus a great stride forward was made. — Hallier then studied in "cultures" the development of the lower fungi, but came to the erroneous conclusion that his "micrococcus" was the primitive form of all the different varieties. The motionless organisms he classed among the fungi; those possessed of motion, among the algæ. This view was opposed by Herm. Hoffmann and de Bary, who demonstrated that a metamorphosis of the micrococcus into bacteria could not take place. Through the influence of Hallier, however, the "micrococcus" was long regarded as the primitive form of the material of contagion. With this was united the question whether these organisms occasioned diseases through the withdrawal of nutriment from the infected bodies, or through the decompositions which they excited in those bodies. Another question arose as to whether the morbific power of these organisms resided in their formed elements or in their fluid constituents, that is in which of the two the infectious principle inhered. This question was raised by Chauveau in 1868.

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[1] They had, however, observed the bacillus anthracis in 1849. (H.)

By the investigations thus sketched, and particularly through the teachings of Hallier, the theory of a contagium vivum, for which Henle as early as 1821 had labored as an earnest pioneer, though it remained still unproven, became current in medicine. In Germany Klebs (now professor in Zürich) became the prominent champion of this theory. In his investigations (Ueber Septicaemia und Pyaemia; Beiträge zur path. Anat. der Schusswunden, 1872) he still stood squarely upon the principles of Hallier, designating his "microsporon septicum" as the cause of wound-diseases, and declaring that this must be introduced into the body from without. By means of "fractional cultures" he also endeavored to exhibit the pure germ. Though he still found numerous opponents, he excited active investigation into the specific character of the exciters of disease.

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[1] Hermann Hoffmann subsequently proved that fermentation did not occur after a fluid had been boiled, provided only that the neck of the retort was bent down so that nothing could drop from the air into it.

The first complete theory on this subject, a theory still based upon the principles of Hallier, was brought forward by Karl Hueter (1838–1882), Prof. of Surgery in Greifswald, in 1873.

According to Hueter, all diseases, whether internal or external, depend upon the entrance of "Pilzmonaden" (fungoid monads) into the body. Primary and secondary wound diseases in particular depend, not upon an "irritant in chemical solution, a poison originating in the chemistry of putrescence", but for the most part upon "a living irritant, represented by the monads as the exciters of putrefaction and inflammation (Monadämie, diphtheritic processes), by an organic irritant (Monaden), a poison contained in the most essential inflammatory product of the pus-corpuscles, i. e. the monads creep into the pus-corpuscles, infect these and through them the blood and the entire organism" etc.

This theory has now become antiquated, but at the period when it was brought forward it furnished a plausible explanation, not only of pathological processes, but also of the memorable success of Lister in the treatment of wounds.

The views of Klebs were opposed particularly by Billroth, who declared that fungi had no essential importance in the processes of decomposition and disease; that they existed everywhere in the air and in water, and did not develop in the body until through putrefaction in it there arose the "ferment of putrefaction" (Fäulnisszymoid), or through inflammation the "phlogistic ferment" (phlogistische zymoid), which supplied favorable feeding-grounds for the "coccobacteria septica". Billroth was also an opponent of the specific character of the lower organisms as exciters of disease.

The pioneer investigations of Herm. Hoffmann, J. Schroeter and particularly of Cohn, prepared the way for the downfall of Hallier's primitive "micrococcus" and the pathological doctrines based directly or indirectly thereon. By cultivation of these organisms upon various solid and nutritive materials (potatoes, bread, albumen etc.) they demonstrated the existence of specifically different fungi, and Cohn classified them and, in accordance with their action, distinguished between saprogenous and pathogenous bacteria. The latter formed the various contagia, and a specifically different contagium for each disease. Cohn likewise discovered the form of fructification (spores) of the bacteria.

The experimental proofs of Davaine (and particularly Robert Koch, who demonstrated the development of bacteria from spores) that anthrax was caused by the bacillus anthracis and by this alone, aided the views now current to secure a victory. Koch also advanced the microscopic investigations by improvements in the methods of staining the bacteria (establishing the color-reaction as diagnostic of definite species etc.) and the preparation of "pure cultures", and demonstrated that in the living body evidence of the difference, and of the pathogenic importance, of the various fungi was best obtained by inoculation.

An account of the innumerable questions and investigations in this department of modern pathogenesis, of the various views on certain questions etc., does not fall within the compass of our brief sketch. Nor are we able to furnish a consistent theory, simply because such an one does not exist. One fact alone is agreed upon, to wit, that certain of the lower fungi, as parasites within or upon the body, excite diseases (infectious diseases). As regards the modus operandi of these parasites two main theories are held. According to one theory, these parasites, by their development, deprive the body of its nutriment and endanger life particularly when, thronging in the blood, they deprive this of the oxygen necessary for existence. According to the other theory, they threaten life by occasioning decompositions which engender putrid poisons (ptomaines). These latter poisons were first isolated by P. L. Panum in 1856, and have been recently specially studied by Brieger (Ueber Ptomaine, Berlin, 1885–86). They act differently upon bodies according to the variety of the alkaloidal poison.

Metschnikoff regards the white blood-corpuscles as antagonists of these parasites (thus explaining the cases of recovery from parasitic diseases), and in this point of view calls them "phagocytes". On the other hand E. Salmon and Theodore Smith (Transactions of the Washington Biological Society, Feb. 22d, 1886) were the first to demonstrate that sterilized nutritive solutions or germ-free products of change of matter of the virulent exciters of disease, when injected, afford protection. A. Chauveau as early as 1880 had brought forward evidence of the probability of this fact, and Hans Buchner in 1879 admitted the possibility of depriving bacteria of their virulence. Pasteur, however, believes he has demonstrated that by continued cultures (also a sort of bacillary Isopathy) "debilitated" germs act as prophylactics against the corresponding parasitic diseases, and he even thinks he has confirmed this by his inoculations against hydrophobia — a view, at all events, still open to doubt.[1]

Inasmuch as, according to Lotze, we cannot foretell the future, but merely prepare ourselves for it, it is wisest to refrain from all criticism of the fate of the germ theory, although, from the almost universal enthusiasm in its behalf at the present moment, a skepticism based upon the history of the past disposes one to doubt its permanence.

The chief diseases regarded as of parasitic origin at present are:

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[1] The protective inoculations against cholera too in Spain have proven very weak, and the experiments of a physician of Odessa have resulted equally unsatisfactorily.

anthrax (Davaine, 1850); relapsing fever (Obermeier, 1873); gonorrhœa and blenórrhœa neonatorum (Neisser, 1879); glanders (Struck, 1882, Loeffler and Schütz); syphilis (Sigm. Lustgarten, 1884); diphtheria (Oertel, Letzerich, Klebs); typhus (Eberle, Klebs); tuberculosis (Koch, 1882); cholera (Koch, 1884); lepra (Armauer-Hansen); actinomycosis (Bollinger in cattle, 1877; Israel in man, 1884); septicæmia (Klebs); erysipelas (Fehleisen); pneumonia (Friedländer); malarial fever (Klebs, Tommasi-Crudeli, Marchiafava); malignant œdema (Koch); tetanus (Carle and Rattone, Nicolaier, Roeschlaub assumed a tetania occasioned by bacilli); cancer (Scheuerlen; priority contested by Dr. G. Rappia and Prof. Domingo Freire of Rio Janeiro); yellow fever (microbe claimed to have been discovered by Freire); dysentery (bacillary diphtheritis of the large intestine); cholera nostras (Finkler and Prior); scarlet fever (Coze and Feltz, '72); variola and vaccina (Keber, Zülzer, Weigert, Klebs); acute yellow atrophy of the liver (Klebs, Waldeyer, Eppinger); endocarditis (Ziegler); hæmophilia neonatorum (Klebs, Eppinger); trachoma (Sattler); keratitis (Leber—aspergillus); ulcus rodens corneæ (Sattler); gonorrhœal rheumatism (Petrone, Kammerer).

If the bacterial theory of infection, constantly threatening life by such numerous pathogenic varieties of infecting organisms, must be looked upon as a gloomy one, the anti-bacterial

PHAGOCYTE THEORY OF METSCHNIKOFF,

professor of zoology in Odessa,[1] is adapted to make one feel more comfortable, inasmuch as it brings into view the possibility of an antagonism to these infecting organisms, and explains the method of nature's cures. Metschnikoff observed that the wandering cells — the white blood-corpuscles — after the manner of amœbæ, surround, hold fast, digest ("devour", hence "phagocytes") and thus render harmless the bacteria which have entered the body. His observations were first made upon the Daphniadæ, subsequently upon living frogs and also upon warm-blooded animals. In monkeys inoculated with the spirilla of relapsing fever, during the afebrile interval he found the spirilla absent in the blood, but enclosed in the cells of the spleen and "devoured" by the latter, so that this organ is to be regarded as the proper curative agent of this disease. (A similar action probably takes place in all infectious diseases accompanied with swelling of the spleen, and thus a considerable portion of the hitherto unknown function of this organ would be explained.) The tubercle bacilli found enclosed in cells in cases of tuberculosis Metschnikoff also declares are thus rendered harmless. The giant cells, however, originate from the irritation of these enclosed bacilli. In these typical giant-cells, discovered by Paul Langhans (1848–1888), the bacilli, according to Metschnikoff, are less readily colored, and are also (?) half-dead. If the bacilli are entirely "devoured" by the phagocytes, spontaneous cure of the tuberculosis occurs. But if the number of the bacilli is too great to be thus devoured, the individual perishes of the disease.

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[1] Elias Metschnikoff now resides in Paris.

The prophylactic effects of inoculation are explained on the theory that by means of this operation the wandering cells are prepared, as it were, for subsequent accidental irruptions of similar pathogenic bacteria, are habituated or compelled thereby to at once devour such organisms when they enter the body spontaneously, and thus to render them harmless. Inoculation would thus be a sort of training or education of the phagocytes.

The immunity of many persons from infectious diseases, so far as it is not effected by inoculations, would by analogy be explained on the theory that with such individuals the phagocytes are from the outset so constituted that they at once render harmless any stray bacteria which come within their domain by immediately devouring them. This explains with equal facility why all persons exposed to the action of pathogenic bacteria in epidemics do not develop the disease, and further, the immunity often possessed, e. g. by physicians, which latter may be regarded as due to the fact that their phagocytes, during their intercourse with bacteria of all kinds or with the sick, by degrees train themselves, as it were, for their anti-bacterial duties, which in this case may be looked upon as preparatory or prophylactic. When, however, in spite of the phagocytes, the patients die of infectious diseases, the fact is to be explained by the excessive number of the bacteria present, which is so great that the phagocytes are unequal to the task of "devouring" them all. (Metschnikoff.)

From the account thus given it will be seen that the phagocyte theory has the characteristics of a good theory; that is, it is very natural, is readily understood, is adapted to explain a great number of facts heretofore not readily explicable and is founded upon observed facts.

It completes too the modern theory of infection on its therapeutic side, and while it deprives that theory, as it were, of its hopelessness, it offers compensation and consolation, especially as it also preserves a place for medical activity — chiefly in training the phagocytes by inoculation.

Of course the phagocyte theory has its opponents, who declare that diseases are cured by the cessation of the process of development of the bacteria in consequence of their death. This explanation must be accepted particularly for those diseases which run a typical course (pneumonia, intermittent fever etc.), a course which would be inexplicable on the theory of Metschnikoff, — Sudden recoveries too can be explained only on the supposition of the sudden dying out or sudden excretion of the causative bacteria, for a sudden devouring of these organisms is inconceivable.

Among the opponents of the theory of Metschnikoff are: Ehrlich, Baumgarten in Königsberg, C. Weigert in Frankfort-on-the-Main, Arthur Hanau in Zürich etc.

The many horrors of the bacillary theory, with its invasion of germs and its inevitability, would be relieved by the pretty theory of Metschnikoff, should the latter become realized. The theory, however, is too pretty to be true. Yet it illustrates once more the experience of the last few centuries, that each new theory is the mother of still another new one.

[In the United States a theory of infection by cryptogamic vegetations was advanced by Dr. J. K. Mitchell of Philadelphia as early as 1849. Dr. J. H. Salisbury (now best known for his theory of the therapeutic effects of large draughts of hot water) also in the sixties believed he had discovered the cause of syphilis, gonorrhœa, malaria, measles and rheumatism in certain microscopic algoid vegetations. His observations, however, were not confirmed by subsequent observers, and the whole subject had fallen into comparative obscurity until revived by the publication of an English translation of "Ziemssen's Cyclopædia" about 1874. Bacteriology became at once the chief subject of medical discussion in the journals and societies, and has since been pursued with a never waning interest.

In the absence of suitable laboratories for the careful study of modern bacteriology and the scarcity of physicians prepared for such work by their previous education, it is not surprising that the United States has as yet contributed little original work to this attractive but difficult department of pathology. The most eminent of the laborers in this field have been: Drs. George M. Sternberg, U. S. A., Thos. E. Satterthwaite, T. Mitchell Prudden and Edward Curtis of New York; H. C. Wood and H. F. Formad of Philadelphia; William Osler, now of the Johns Hopkins University, Baltimore; W. T. Belfield and Nicholas Senn of Chicago etc.

The recent erection and endowment of several pathological laboratories, provided with suitable apparatus and a competent staff for the study of bacteriology, leads to the hope that ere long the United States may take an honorable position in this, as in other departments of medical investigation.

The pathological laboratory of the Alumni of the College of Physicians and Surgeons of New York was opened in 1878; The Carnegie Laboratory of New York, in 1885; the Loomis Laboratory, also of New York, in 1886; the Hoagland Laboratory of Brooklyn, in 1888, and the laboratory connected with the Johns Hopkins Hospital in Baltimore during the present year (1889). H.]

3. PHYSICAL EXAMINATION OF THE SICK.

The practical medicine of our century has undoubtedly gained many important and permanent advantages by our improvements in the diagnosis of the phenomena and pictures of disease, an art which has been pushed to a point not only unattained, but even undreamed of in by-gone ages. In fact, according to all appearances, later generations will recognize as the actual advances of our day, not so much the theories brought forward to gain a greater insight into the essence of morbid life (which they too have been unable to attain), as its diagnostic procedures, which have proven in very many ways so decidedly useful to the practice of, medicine. Yet undoubtedly a number of these methods the future will condemn and drop as originally overestimated. The theories of our century, like those of earlier date, will doubtless claim a place in the history of medical culture, but our methods and means of diagnosis will remain, at least in part, firmly and permanently established in medical practice. For, as the great Haller with resigned modesty affirmed emphatically of himself and his time, medical theory, even to-day, fails to penetrate to the essence of nature, but the inventive mind in diagnosis has been able to facilitate the detection of a greater part of the external phenomena of morbid life than was the case in earlier times.

Our aids to practical knowledge in medicine are derived from the natural sciences, so highly developed in our day, and which medicine has fortunately and successfully rendered subservient to itself in the department of diagnosis. If we must make any charge against this tendency of the present age, it must be based upon the fact that it employs too much and too exclusively the senses as armed by the natural sciences, to the exclusion of simple Hippocratic investigation by the unaided senses, which is often sufficient in ordinary cases, and thus inflicts too frequently upon the sick an unnecessary annoyance. Moreover we are constantly seeking too earnestly for new methods of investigation, from which frequently originate exaggerated ideas of new procedures and the neglect of therapeutics.

The physical diagnosis of our own day took its origin in the 18th century. Our system of accessories has been built up entirely upon Auenbrugger's percussion — the German "corner-stone of all modern diagnosis".

The first impulse came directly from Auenbrugger's invention, and was given by the famous and humanely great physician-in-ordinary of Napoleon I., baron

JEAN NICOLAS CORVISART-DESMARETS (1755–1821), a native of Dricourt in Champagne.

In 1808 Corvisart translated the treatise of the German reformer of diagnosis, and by this, as well as by his treatise upon diseases of the heart published in conjunction with his pupil Horeau, he contributed largely to the development of the medicine of the 19th century.

Corvisart received his first instruction from a priest who was likewise a relative, and was originally destined to the law. Yet when he came to Paris he devoted himself to medicine, and was a distinguished pupil of Vicq d'Azyr, Antoine Petit, Louis, Desault, Bucquet, Portal, Desbois de Rochefort and others. In 1795 he was appointed professor in the medical clinic of the Charité, a department established by his predecessor and teacher Desbois. Subsequently, together with Barthez, he was appointed ordinary physician of the First Consul, and then of the Emperor Napoleon, who in this appointment once more gave evidence of his proverbial insight into practical capacity and greatness of character. On receiving this appointment

Corvisart resigned his position as a professor. He clung to Napoleon with inviolable faithfulness, yet always preserved his independence and his frankness, a thing which few others ventured to do. "Sire", he exclaimed after the birth of the King of Rome, addressing himself to the Emperor, "this prince must crown all your wishes! Recall your career: in less than ten years a simple officer of artillery, then captain, general of brigade, general-in-chief, First Consul, emperor, spouse of an archduchess of Austria, father of a prince. Having reached so dizzy a height of fortune, rarely attained by any mortal, I beg your majesty to stop! Fortune may turn; you may yet fall." "That I call the speech of a genuine peasant", said Napoleon, yet his opinion of Corvisart was expressed as follows: "He is an honest and able man, but a little rude" (Isensee). After the death of Napoleon Corvisart declined all public office. He died of a disease of the heart, an affection of which he had made a special study, and in this respect met the same fate as many important physicians. — Besides his great frankness, Corvisart was adorned with the greatest love for the truth, with beneficence, and with benevolence towards all. In a word he was, what Hensler demanded above all of a great physician, a thoroughly good man. Accordingly among all his contemporaries Corvisart had the most eminent physicians for his biographers, a Dupuytren, a Cuvier, the alienist Guillaume Marie André Ferrus (1784–1863) and Étienne Pariset (1770–1847; born at Grands, near Neufchateau in Champagne, General Secretary of the Académie de Médecine), the eloquent author of numerous so-called éloges, and a poet likewise. — Corvisart's chief work was the "Essai sur les maladies et les lésions organiques du cœur et des gros vaisseaux", 1806, republished twice, the last time in 1818. His grandnephew Lucien Corvisart was ordinary physician of Napoleon III. and the Prince Imperial, and died in 1882, aged 71 years.

As a clinical teacher and pathological anatomist Corvisart exercised an extensive influence. The coryphæi of the French school of pathological anatomy, a Bayle, Laënnec and Dupuytren, were educated by him. As a diagnostician he enjoyed the greatest reputation, a statement proven by the anecdote that he once diagnosticated — or accidentally guessed, which requires less credulity on our part — the disease of which a person, whose picture only had been shown to him, died — of course it was a cardiac affection.

It was a pupil of Corvisart's who supplemented the discovery of Auenbrugger by the equally useful discovery of auscultation. This was

René Théodore Hyacinthe Laënnec (also Laennec, la Ennec, even Leinek in the effort to establish his German descent; 1781–1826), who has been already mentioned as an eminent pathological anatomist.

Laënnec descended from a respectable family in the little city of Quimper in Bretagne, and was born Feb. 17, 1781. His father, who became a widower at an early period, neglected the education of his children, but soon brought them, including the future discoverer of auscultation, to his brother, one of the first physicians of Nantes and a man in every way distinguished. The latter, however, was able to do little towards the preliminary scientific education of the boy Laënnec, since all the schools were closed for a long period during the Reign of Terror, and he himself found his time too much occupied by the demands of his profession. Instead of schools there were hospitals and camps, to which the feeble lad always accompanied his uncle, and these formed the means of educating the youthful Laënnec for his future profession. The zeal manifested for medicine at even so early a period of his life soon directed attention to Laënnec, and accordingly he was nominated assistant in one of the military hospitals and subsequently even appointed a field-surgeon in the war carried on by the government against the refractory department of Morbihan. At the close of this campaign, which probably tended to strengthen his delicate frame and of which he has written a description, he went, a youth of nineteen, to Paris, and with wonderful perseverance and the best success filled up the gaps in his school education. Latin and Greek he acquired so thoroughly that he knew how to write well in both languages — certainly very exceptional ability for a modern Frenchman. His medical studies too he pushed with restless zeal. In the year 1815, after having published numerous important papers (a thesis which questioned the existence of Hippocrates, another on the importance of Hippocrates to practical medicine, others on acephalocysts, angina pectoris Heberdenii, cancer, peritonitis, aneurism of the heart, tubercle etc.), he made in the Société de l' École his first experiments with the stethoscope. His instrument at this time was about ten inches long, with a diameter of about four inches, and contained in its thoracic extremity an obturator, upon which he laid great stress. The invention of this instrument was due to accident. In order to hear the sounds of the heart more clearly, he employed on one occasion with a lady a cylindrical roll of paper, and then immediately constructed upon the same principle the instrument now used everywhere. In the year 1806 he was appointed physician to the Hôpital Beaujon, and in 1816 received a similar appointment in the Hôpital Necker. In 1819 appeared his work "De l' auscultation médiate, ou traité du pronostic des maladies des poumons et du cœur, établi principalement à l' aide de ce nouveau moyen d' exploration," which was speedily translated into all the languages of Europe. From the year 1820, however, his feeble body yielded more and more to that disease, the knowledge of whose pathological anatomy he had most promoted, and in spite of frequent and long interruptions in his duties as professor in the Paris faculty, where he had conducted the clinic for internal diseases from 1823, and in spite of a sojourn in his native place, he succumbed to phthisis on August 13, 1826, at the early age of 45, though not until he had completely performed his life's task.

Laënnec's slight appreciation of his own immortal services to medicine was remarkable, though not entirely inexplicable. On the other hand, the delicate, insignificant-looking man prided himself particularly on his skill in riding and in mechanical tasks. As a man he is said to have been distinguished for great goodness of heart, an incorruptible sense of justice and a rare tolerance for views differing from his own, as well as for an energy not to be quenched by bodily disease. As regards the recognition and the success of his labors, the French Laënnec met a fate entirely different from that of the German Auenbrugger. Recognition, honor and fame, with a brilliant position, followed close upon the publication of his well-known work.

Among the other French coryphæi in percussion and auscultation we must mention especially A. Aran, Bouillaud, Andral, Gendrin, Beau, Jean Baptiste Barth (1806–1877) of Saargemund, a pupil of Louis, physician to the Hôtel-Dieu, President of the Académie de Médecine and the physician of Thiers; Henri L. Roget, who, in conjunction with Barth, published in 1841 a well-known "Traité pratique de l' auscultation", translated into most of the modern languages; Briquet; Louis (Voussure précordiale in diseases of the heart); Chauveau; Récamier; V. Collin (pericardial friction sound); Fournet; Trousseau; M. Fauvel (1813–1884), Vice-president of the Académie de Médecine and an epidemiologist; A. Raciborsky; Briançon; Andry; Monneret; Rilliet and Barthez; Bergeon; Moreau de St. Ludjère (Cystoscope); Duroziez; Parrot (died 1883) of Paris, who became famous as a physician to children; Rouanet, who explained the sounds of the heart by closure of the valves in 1832; H. Damoiseau (curved outline of the dullness in pleuritic effusion, 1844) etc.

In Germany Laënnec's method was first recommended by Marx, but it was first employed extensively at the clinics of the famous Peter Krukenberg (1788–1865) and Schönlein.

[In England the treatise of Laënnec was translated by Dr. John Forbes in 1821, and the same author published in 1824 "Original cases, with dissections and observations, illustrating the stethoscope and percussion in the diagnosis of the diseases of the chest". Robert Spittal (1804–1852) of Edinburgh was an eminent cultivator of physical diagnosis and author of a "Treatise on auscultation in diseases of the chest", 1830. William Stokes, the famous clinician of Dublin, published in 1824 an "Introduction to the use of the stethoscope", and in 1837 appeared his "Treatise on the diagnosis and treatment of diseases of the chest". Dr. Chas. J. B. Williams of London also published in 1828 "A rational exposition of the physical signs of the diseases of the lungs and pleura", and the subject of auscultation and percussion was discussed freely and thoroughly by Sir James Clark, Richard Townsend of Dublin (Tabular view of the principal signs furnished by auscultation and percussion, and of their application to the diagnosis of the diseases of the lungs, 1832), James Hope (A treatise on diseases of the heart and great vessels etc., 1832), Peter Mere Latham (Lectures on diseases of the heart, 1845); Walter H. Walshe of London, the eminent author of "Physical diagnosis of diseases of the lungs" (1843) and "Practical treatise on diseases of the heart" (4th ed., 1873); Henry M. Hughes (1805–1858), physician to Guy's Hospital (Clinical introduction to the practice of auscultation etc., 2d ed. 1854); Richard P Cotton (1820–1877), physician to the Hospital for Consumption and Diseases of the Chest at Brompton (Clinical lectures on the physical diagnosis of phthisis, 1862); Horace B. Dobell (Demonstrations of the diseases of the chest and their physical diagnosis, 1858); Peyton Blakiston (1801–1878) of Birmingham, and others.

Manuals of physical diagnosis were also published by Michael Ryan of Edinburgh (1837), D. Spillam of Dublin (1837) and Patrick S. K. Newbigging of Edinburgh, who translated the work of Barth and Roger in 1847. In the United States the method of Laënnec made but slow progress, partly in consequence of the inertia and indifference of the profession, partly from the wide-spread prejudice against "Frenchified" novelties, and partly from the difficulty of verifying by autopsical examination the conditions established by physical exploration during life. The "Manuel de clinique, ou des méthodes d' exploration en médecine, et des signes diagnostiques des maladies" etc. of Louis Martinet is said to have been translated into English by Jones Quain of London and published at Philadelphia in 1827, and the "Rational Exposition" etc. of Dr. C. J. B. Williams appeared from the press of Carey and Lea, Philadelphia in 1830. Yet the "Lexicon Medicum" of Robert Hooper, of which an American edition was published by the Harpers, under the care of Dr. Samuel Akerly of New York, in 1831, does not even mention the subject of auscultation, though an edition of Samuel Cooper's "Dictionary of Practical Surgery", published by the same firm in 1830 under the editorship of Dr. David Meredith Reese, devotes a short paragraph to its consideration. In 1836 the Massachusetts Medical Society published in its "Library of Practical Medicine" three dissertations on the question, "How far are the external means of exploring the condition of the internal organs to be considered useful and important in medical practice?" These dissertations were submitted in competition for the Boylston Prize by the now famous physician, poet and wit, Dr. Oliver Wendell Holmes, Dr. Robert W. Haxall of Richmond, Virginia, and Dr. Luther V. Bell (1806–1862) of Derry New Hampshire. The Boylston Medical Committee awarded the gold medal to the dissertation of Dr. Holmes, but also voted the sum of $50 to the authors of the other two dissertations, and decided to publish all three papers in "a volume to be distributed gratuitously to each Fellow of the Society, and to every other respectable physician in Massachusetts." Dr. Bell in his dissertation, after giving an account of Laënnec's invention of the stethoscope, adds in a note:

"I have no means of knowing to what extent the practice of exploration of the chest has been adopted in the United States. In the larger towns and cities, I am aware, it has been considerably and successfully cultivated, but in the interior of New England, at least by the great body of practitioners, it has been neglected."

Dr. Holmes also says:

"At the present day it is well known that some practitioners of a certain merit, and particularly some who pride themselves on strong sense and intuitive sagacity, habitually neglect and depreciate the value of the physical signs, even of thoracic disease."

It will thus be seen that the advantages of Laënnec's method were by no means generally recognized in the United States even as late as 1836. It should, however, be recorded that Dr. James Jackson, Jr., of Boston, whose untimely death deprived medicine of one of her most promising and devoted students, while pursuing his medical studies in Paris, communicated to the Société Médicale d' Observation in 1833 a paper on a prolongation of the expiratory sound as an important sign of the early stage of phthisis. The value of this sign is now universally recognized. Dr. John Collins Warren (1778–1856) of Boston, the eminent surgeon, had also published as early as 1809 a paper entitled "Cases of organic diseases of the heart; with dissections" etc. But the earliest systematic treatise on the diagnosis of thoracic diseases written by an American physician was the work of Dr. W. W. Gerhard (1809–1872) of Philadelphia, a pupil of Louis, who in 1836 published his treatise "On the Diagnosis of Diseases of the Chest". Two years previously had appeared the "Illustrations of pulmonary consumption" etc. by Dr. Samuel George Morton (1799–1851) of Philadelphia. Gerhard's work was succeeded in 1856 by the standard treatise of the late Dr. Austin Flint (1812–1886), entitled "Physical exploration and diagnosis of diseases affecting the respiratory organs", which continues to be one of the most popular works upon the subject of auscultation and percussion. The "Practical Treatise on Phthisis Pulmonalis" of Dr. L. M. Lawson (1812–1864) of Kentucky, which appeared in 1864, also deserves notice in this connexion. The now almost universal plan of removing extensive pleuritic effusions by aspiratory thoracentesis is very largely due to the ingenuity of Dr. Morrill Wyman, who invented in 1850 a suitable aspirator, and to the energy and determination of Dr. Henry I. Bowditch of Boston, who adopted and forcibly advocated the operation at a period when it had few friends.

Among the more modern cultivators of physical diagnosis it will be sufficient to mention, besides those already noticed, Alfred L. Loomis and James R. Leaming of New York, J. M. Da Costa (Medical Diagnosis, 1864) of Philadelphia. H.]

The interpretation and conception of auscultatory phenomena by Laënnec were essentially different from those to which Skoda gave currency. Laënnec investigated and regarded them as pathognomonic signs of perfectly definite morbid conditions of the viscera, and formed empirical categories of sounds, while Skoda, in a manner truly scientific, formed his memorable physical rules upon the basis of the principles of acoustics. Laënnec too believed that the results of mediate auscultation might be essentially different from that practised with the ear alone. — Like Auenbrugger and Corvisart he practised percussion with the simple fingers.

An entirely new department of auscultation was opened in 1821 by

J. A. Lejumeau, Vicomte de Kergaradec (died 1877), when he applied this art to the diagnosis of pregnancy and the life of the fœtus, without knowing that Matthias Mayor as early as 1818 had observed the fœtal heart sounds, so that Lejumeau is to be considered the discoverer only of the uterine souffle. On the other hand,

Lisfranc was the first to employ the methods of physical investigation in surgery.

Laënnec's instrument of course underwent in the progress of time innumerable modifications and combinations, the enumeration of all of which would be impossible. First the obturator was dropped as useless and injurious. Then the instrument was made of the most various materials, ranging in course of time from fir-wood to silver and hard-rubber. Then it was made shorter and smaller in diameter (Piorry, Louis), as well as combined with the pleximeter (Piorry). The ear-plate, originally fastened to the body, was made removable, and either flat or hollowed out (Vernon-Waldenburg), and two cones of different size were fitted to the body proper for auscultation of the lungs and the vessels etc. Among the special forms of the stethoscope are: the (Schlauch-Glashütchen) stethoscope of A. Groux (died 1878), to which the Paris physicist König added a closed resonator with an elastic membrane of caoutchouc; the stethoscope of Landouzy (polystethoscope), with several tubes at one end, so that several persons can listen to the same murmur at once; the binaural stethoscope of Scott Alison, with two tubes and ear-funnels, with which one can listen to the heart and lungs at the same time; the stethoscope of Leared and Cammann,[1] which with two ear-tubes has a single thoracic extremity; the stethoscope of Hutchinson; that of the author with three adjustable extremities, immovable ear-plate and conical lumen (Medic. Diagnostik, 2d edition, Enke, Stuttgart, 1863; Zur Percussion, Auscultation und Phonometrie, 1876). The solid akuoxylon has been discarded by P. Niemeyer himself. G. Gerhardt used so-called resonators.—The adjustable ends of the stethoscope have been filled with water (Alison), and the instrument thus converted into a "hydrophone"; or it has been combined with an electric chime of bells (sphygmophone of Upham), or with the thermometer (Eugène Woillez, died 1882), etc., etc. The best stethoscope, however, continues to be the ear itself in ordinary cases, where modesty, cleanliness and propriety permit its use.

Pierre Adolphe Piorry (1794–1879) of Poitiers,

from 1835 physician to the Hôtel-Dieu and a year later physician to the Hôpital de la Pitié, in 1840 appointed professor of pathology and in 1866 retired,

invented in 1826 the pleximeter for the practice of mediate percussion. He likewise devised the so-called "Dermographie", and was the first to include the abdominal organs in the department of physical diagnosis (1835), at the period when Bouillaud was cultivating particularly the investigation of the heart.

Piorry was an extremely fertile,[2] but also a whimsical writer, as is manifest from his devoting his attention particularly to the nomenclature of disease. Among some of his curious titles we may mention hypersplenotrophie, dysgastronervia, cardiodysneuria etc. His hints on the examination of the sick and on practical tact are manifestly borrowed from real life. Thus he says: "The art of examining a patient demands long study and extensive knowledge. . . . The examination should generally be short, so as not to weary the patient . . . . . (a thing not infrequently forgotten) . . . . . To ask a question twice is better than once, and to examine a patient a second time, after an interval of 24 hours, is better than a single examination. . . . . Emphasis and arrogance should be avoided without becoming commonplace. . . . . Questions must be answered, however useless they may be, for in the eyes of the world they have a great value, and the physician cannot neglect these little nothings when related to him by the patient. . . . . . The physician should behave with firmness but with courtesy, unite cold-bloodedness with a certain amount of feeling, and in important matters stand firmly upon what he regards as for the good of the patient. Prejudices which he cannot overcome he must know how to yield to (though always giving them his censure), unless they are unaccompanied with danger. These precautions the physician should not neglect if he desires to make his fortune in this world, where savoir faire often commands more success than reason and sound understanding"—plain counsels which the practical Frenchman or Englishman teaches his pupils, while in Germany, to their loss be it said, physicians must improve upon the faults of inexperience by the teachings of daily life alone. — Piorry's diagnostic armamentarium consisted of a taper for illumination, a tongue spatula, magnifying glass, warm water, grease for anointing the finger, the stethoscope and pleximeter, tape measure, rectal and vaginal specula, dressing-forceps and tweezers, œsophageal, rectal and urethral sounds, nitrate of silver for marking, a test-tube, nitric acid and other reagents, litmus paper and graduated glasses (Kratzmann).

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[1] Cammann's binaural stethoscope was completed in 1852 and described in the New York "Medical Times" for January, 1855. The double stethoscope of Dr. Leared was exhibited at the International Exhibition in London in 1851. It consisted of two gutta-percha tubes attached to the chest-piece at one extremity and at the other to the ear-pieces. H.

[2] Among his works are the "Traité sur la percussion médiate", 1828; "Clinique médicale", 1832; "Traité des alterations du sang", 1833; "Traité de médecine pratique et de pathologie iatrique ou médicale", 1842–51; "Traité du diagnostic et de séméiologie", 3 vols., 1836–37 etc.

The form of Piorry's ivory pleximeter, by means of which he tested the feeling of resistance upon which he laid great emphasis, was that of a tolerably large semicircle with two lateral rims and a centimeter scale upon the straight edge.

The latter was also applied to Traube's zither-like pleximeter with adjustable rims, to the oval glass pleximeter of W. Hesse, and to other forms of this instrument. That the pleximeter was and is made circular, very large and very small, oval etc., or of wood, leather, ivory, caoutchouc etc., is a matter of course. The most useful, though not the most elegant in form, is the trowel-shaped pleximeter of Eugen Seitz in Giessen (modified variously: the perpendicular into a horizontal plate in the author's instrument), while the cylindrical pleximeter of the physician next mentioned consists of rolled caoutchouc (1873).

MAX ANTON WINTRICH (1813–1882),

of Sferzing in the Tyrol, may be looked upon as the improved German Piorry. He continued until the close of his life extraordinary professor in Erlangen, in spite of the fact that he was a beloved teacher and a popular physician. He was the inventor of the percussion hammer, and of the acoustic sound for the investigation of vesical concretions. The latter instrument has been recently combined with the microphone. The sound was first put to acoustic use in 1819 by Jean Joseph Reynaud, a physician who also wrote on pectoral fremitus in 1816. Wintrich was also the inventor of linear percussion, and was a physical diagnostician of equal acuteness and conscientiousness. His knowledge of acoustics far exceeded that of Skoda, who adopted a nomenclature applied to musical instruments and not derived from acoustics. Yet Wintrich was unable to keep himself entirely free from the influence of Skoda. Seitz made his percussion hammer of horn, others of other materials, but no substantial advantage was gained by any of these modifications.

The combined diagnostic procedure of Autophony was invented by Hourmann as a distinct method of physical examination, though the subject had been already studied by Bricheteau (1834) and Taupin (1839). It has as little value for the practitioner as the combination of percussion and auscultation entitled acouophony, and brought forward by the American physicians Cammann and Clark[1] (1843). C. Gerhardt practised auscultation of the sounds of the heart and lungs by means of a tube introduced into the pharynx, and Verardini (1873) even investigated uterine sounds by means of a stethoscope introduced into the vagina and placed against the portio vaginalis, a procedure which he dignified with the name of "Intravaginal auscultation"! Both these procedures are mentioned merely to show how far the method of Laënnec has been run to seed. Phonometry, brought forward by the author in 1872, may be practically less independent and rather applicable to the control of percussion, while its greater scope probably lies in the department of theory.[2] W. Hamburger (died 1872), a practitioner at Gabel in Bohemia, taught auscultation of the œsophagus (Klinik der Oesoph.-Krankheiten).

The method of Spirometry seems destined to attain greater importance than the procedures last mentioned, though it cannot be readily practised in the life of the ordinary practitioner. It was brought forward in an available form by John Hutchinson in 1846.

The method was introduced to general attention in Germany by Samosch in 1849, though professor J. Vogel in Giessen had used it as early as 1848, and Gustav Simon, the now famous surgeon of Heidelberg, wrote a description of Vogel's experiments. They were followed in Germany by Stellwag, who according to Phöbus, simplified the original spirometer, and by Jähne, Albers, Häser, Kuchenmeister and particularly Wintrich, who constructed an improved instrument. — Even before Hutchinson other physicians had occupied themselves with similar investigations, though without having any adequate apparatus. Among these were Edward Kentish (died 1832), Abernethy and Thompson. The method was afterwards tested by Walshe, Green, Davies and Pereira in England.

Pneumatoscopy, i. e. the study of the expired air (chiefly as to its proportion of carbonic acid) by means of a special apparatus, first introduced by Wintrich in 1852, has as yet attained little popularity. The same may be said of the recently proposed investigation of the amount of the respiratory pressure, the so-called "Pneumatometry", and the Anapnography of French physicians, which by means of a kind of spirometer fitted to the nose marks the respiratory curves. Pneumatometry was employed by Dr. Ph. Biedert in the diagnosis of the course of diseases of the lungs, and Pneumatotherapy originated with J. Hauke in 1870.

Mensuration, which, as we know, finds its application as well in surgery as in medicine and obstetrics (pelvimetry etc.), is of larger scope

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1. Auscultatory percussion was presented to the profession in a paper prepared by Drs. G. P. Cammann and Alonzo Clark, and published in the "New York Quarterly Journal of Medicine and Surgery", July, 1840. The method has never come into very general use. (H.)
2. According to the "Presse méd. belge" (No. 16, 1875), J. Grasset in "Montpellier méd." has called attention to a new side of this procedure. He concedes its diagnostic utility, though he disputes the identity of the results of percussion and phonometry. See "Zur Percussion, Auscultation und Phonometrie" by the author.

than the procedures last mentioned. Besides the centimeter measure (a most useful instrument in the requirements of medical practice) and the callipers, other special instruments have been gradually invented and furnished with names. Some of these are designed for particular purposes, e. g. for investigation of the thorax, like Sibson's Thoracometer (properly chest-measurer, 1847), Quain's Stethometer (1850), Alison's Stethogoniometer, the Cyrtometer of Woillez (1838) etc. F. Riegel in 1873 brought forward the Stethograph, to exhibit graphically the respiratory movements. All these complicated methods, however, are better suited to clinical instruction than to everyday practice, and are, on the whole, of little practical value.

That the scale, which, as we know, was already utilized by Sanctorius, has been employed under various new forms as a means of physical investigation, particularly in determining the condition of nutrition, we need merely mention. It suffices too merely to mention the fact that

The Loupe, in the department of optical accessories, has been employed both for magnifying purposes and for illumination. Oblique illumination was employed by R. Liebreich in 1855, though, according to Otto Becker, it had been already recommended by Himly in 1805. The microscope, however, has become one of our most important means of exploration (in forensic medicine also), particularly since the days of Schönlein, for only by its aid can we diagnosticate certain forms of disease.

In passing to a consideration of the most important diagnostic aid in diseases of the inner parts of the eye we need only refer cursorily to the apparatus for testing the distinctness of vision, such as the test types of Jäger, Hermann Snellen (an oculist of Utrecht) etc., spectacles, prisms and the optometer. The powerful aid to the oculist, to which reference has been just made, the ophthalmoscope, was invented by professor Hermann Ludwig Helmholtz in the year 1851.

History informs us that Méry, as early as 1704, by the accidental observation of the reddening of the pupil of a cat held under water, laid the first foundation stone of the ophthalmoscope. His observation was repeated by P. de la Hire (1640–1718) in 1709. Gruithuisen (1810), A. P. Prévost (1810), Esser (1826), Hassenstein (1836), Behr (1839), Cumming (1846), E. Brücke (1847), and especially A. Kussmaul[1] (1845), and C. L. von Erlach in Berne followed with investigations on the subject of the red pupil and explanations of the fact, without, however, artificially illuminating the fundus of the eye.

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[1] Born in 1822 at Graben near Carlsruhe, practised in Kandern, then became a professor successively in Erlangen, Freiburg and Strassburg and was retired in 1888. We record here an observation made by this famous Strassburg clinician at the opening of the Naturforscherversammlung in 1885, and which is as honorable to, as it is characteristic of its author: "Let us ask openly, gentlemen, what is all our medicine without compassion and the power of self-denial? When science is struggling for knowledge and truth she requires men of arms, bold in combat and cool of understanding; but when she descends from her lofty position to the sick and stricken, she must put on the mantle of humility, and in forbearance and gentleness bear in her bosom a warm heart."

The ophthalmoscope presupposed an answer to the question why it is that our pupil looks black. The explanation of this fact, according to Helmholtz, is that when we look at the eye of another person an image of our own pupil only is formed in his eye and reflected directly back to the pupil of the observer, so that the latter does not see anything of the fundus of the observed eye, particularly as in ordinary examination of the eye of another all lateral rays of light are shut off by the observer's own head. If a third eye could be slid in between the observing and observed eye without concealing the one eye, this eye, would receive an image of the fundus. Of course this is impossible. The first problem, therefore, was to illuminate artificially the fundus of the eye to be observed, and to place this illuminating apparatus between the two eyes. But this plan alone rarely suffices to enable us to see the fundus oculi clearly. As our eyes can unite into an image only divergent or parallel rays, the rays of light reflected from the fundus, which are always convergent, must be made to diverge. This result was attained by the addition of a dispersion-lens *behind* the illuminating mirror. Helmholtz also combined four transparent glass plates so as to form an angle of incidence of 60°, and by means of these reflected into the eye to be observed the rays of a light placed at one side, and added also behind this transparent illuminating apparatus a dispersion-lens. Both these united into a convenient instrument formed the original ophthalmoscope of Helmholtz, which was liable only to the objection that its use required great practice.

The principle once established, numerous improvements were next made in Helmholtz's instrument. It was followed by the ophthalmoscopes of Follin, Ruete, Coccius, Epkens, Stellwag von Carion, Burow, von Hasner, Klaunig, Saemann, Zehender and others. Those of Ed. Jäger and Liebreich are usually regarded as the handiest and most convenient.

The ophthalmoscope has now been in use only about a third of a century, and yet it is diffused over the whole world. Such unexampled recognition did it receive even during the first years after its invention, an evidence how much more sensitive modern medicine, since the days of Auenbrugger, has become to new means for the promotion of medical knowledge. Germany may also be justly proud of this work of an inventive and scientific mind!

The biography of the inventor of the ophthalmoscope is very simple, yet so much the richer in results and investigations.

Hermann Ludwig Helmholtz was born in Potsdam, August 31, 1821. After completing his studies in his native city, he became an army physician there (1842), until his appointment as professor of physiology in Konigsberg in 1849. In 1847 following in the footsteps of Robert Mayer, he wrote his famous work on the conservation of force (Ueber die Erhaltung der Kraft). Subsequently (1855) he settled in Bonn and then in Heidelberg (1858). Among his works are the phenomenal treatise "Die Lehre von den Tonempfindungen" (1862, 3d edition 1870), a book on physiological optics, a treatise on acoustics by Tyndall and Helmholtz etc Since 1870 Helmholtz has been a member of the Berlin faculty.

By the invention of the ophthalmoscope the whole department of ophthalmology was revolutionized, and in many respects newly constructed. To the ophthalmoscope alone German ophthalmology also owes its advances, surpassing those of all other nations, so that now German oculists, as by far the most skilful and most popular of specialists in this department, have borne the invention of Helmholtz into all parts of the globe.

E. Bouchut in 1863 christened the examination of the eye with the opthalmoscope "Cérébroscopie", because by this means inferences might be drawn regarding acute and chronic diseases of the meninges and the brain itself. With equal justice, however, we might speak of Renoscopy with the ophthalmoscope, because by its aid Bright's disease may also be diagnosticated.

In importance for its particular department the laryngoscope is a diagnostic means quite equal to the ophthalmoscope.

Laryngoscopy was first practised in an imperfect way by Benjamin Guy Babington (1829), P. Baumès in Lyons (1838), with a prism in 1844 by the Scotchman Adam Warden of Edinburgh, while the Scotch surgeon Liston in 1840 constructed an instrument similar to our present laryngoscope. The Spanish teacher of singing in London, Manuel Garcia, in 1855 brought forward a small laryngoscope, which, however, he used simply for physiological researches. Senn in Geneva also invented a special laryngoscope. The instrument was employed in the diagnosis of disease almost simultaneously by Türck and Czermak. Special laryngoscopes have been brought forward by Tobold and Lewin in Berlin, Fr. Semeleder in New York, Störck in Vienna, von Bruns in Tübingen, C. L. Merkel (1812–1876) in Leipsic and others.

The ear speculum also depends upon the principle of the reflection of light, and a large number of varieties of this instrument speedily followed the invention of the laryngoscope. Among the inventors of aural specula were W. Kramer (died 1875), one of the earliest pioneers of this department in Germany (auscultation of the ear); Baron A. von Tröltsch in Würzburg, the earliest (1860) special professor of aural medicine; Julius Erhard (died 1873) in Berlin; Adam Politzer, Joseph Toynbee (1815–1866) of London, John B. Brunton (inventor of the otoscope in 1861) and others. The majority of nasal specula are constructed in accordance with the laws of reflected light, but that of Fränkel, on the contrary, depends upon simple dilatation of the nose, like the earlier oral specula of Heister, Langenbeck, A. Lüer (1802–1883), Charrière (died 1876). Matthieu père (died 1879). The aural probe of Hermann Wendt (1837–1875) should also be mentioned here. — Rhinoscopy was first essayed unsuccessfully in 1807 by Phil. Bozzini (1773–1809) of Mayence, a practising physician in Frankfort (Der Lichtleiter etc. 1807), and by Sir William Wilde (died 1876) in Dublin. Czermak was the first to apply the method successfully. — The primeval (Hippocratic)

Rectal speculum, like the modern instrument of Weiss, worked with a catch, while the rectal speculum of Fergusson likewise utilized the reflection of light. The latter is also the case with the instrument for the investigation of the mucous membrane of the urethra and bladder, the so-called

Endoscope of A. J. Desormeaux, Jr., (1863), Fürstenheim in Berlin, Grünfeld in Vienna, Nitze in Dresden (electric illumination of the internal surface of the bladder), whose predecessors were Bozzini and Ségalas.

One of our most important diagnostic procedures is, as we all know the employment of the vaginal speculum. The Ancients (e. g. Paul of Ægina), as well as the Arabians, had special instruments for the investigation of the uterus and vagina. P. Franco (1561) invented a new speculum, and his example was followed by others. But the most lasting influence upon the employment of this instrument was exercised by the Paris physician and successor (1821) of Corvisart, Joseph Claude Anthelme Récamier (1774–1856), who in 1818 reintroduced it to the profession.

Récamier was born at Rochefort in the deparment of Ain, was appointed in 1801 physician to the Hôtel-Dieu and employed the speculum vaginæ in his course here as early as 1805. In 1821 he succeeded Corvisart and in 1830 resigned his position, but resumed his lectures as a *professeur libre* in 1837. In 1842 he became a member of the Académie. The speculum, forgotten since the days of Purmann and Dazan (Proksch), has continued in popular use and has undergone innumerable modifications. Popular vaginal specula are the bivalvular instrument of Ricord, the trivalvular speculum of Ségalas, the cylindrical milk-glass speculum of Mayer, in sets of different sizes with an obturator, etc. All of these instruments, however, yield in practical usefulness to the duckbill speculum of Dr. J. Marion Sims (1813–1883) of the United States. The bath-speculum of Martin (died 1875) is useful for therapeutic purposes.

The so-called "Splanchnoscope" of J. B. Fonssagrives (1860), professor in Montpellier, J. Brück (1868) and Milliot is of as little importance as the endoscope.

The employment of the Spectroscope for the detection of sugar, bloodstains etc. forms one of our most recent diagnostic procedures.

The application of electricity to the determination of the central or peripheral seat of diseases of the nervous system by the susceptibility of the latter to irritation, and the employment of the same agent to differentiate cases of real and apparent death, as recommended by M. Rosenthal, professor in Vienna, in 1872, are other examples of modern diagnostic methods.

Needles and callipers serve to test the sensibility, as in the æsthesiometer of Sieveking, the baræsthesiometer for testing the sense of weight, the algesiometer and algesiochronometer of F. Bjoernstroem of Upsala (1876), etc.

That chemistry has also been made subservient to diagnosis is proven by the daily examinations of urine etc. in our clinical institutions and at the bedside of private patients, and the same may be said of microscopic examinations. Chemical investigations enjoy the not inconsiderable advantage that they are able to establish the existence of minimal quantities of matter, and can follow the latter in a way quite unattainable in other modes of investigation, i. e. into the very tissues themselves. The boiling of the fluids of the body as an aid to diagnosis likewise belongs among the physical methods, e. g. albumen in urine, demonstrated by Dr. John Blackall (1771–1860) of Exeter in England (1813).

For determining the specific gravity of fluids, particularly of urine, we employ the areometer or urinometer invented by Johann Florian Heller of Vienna in 1849.

New forms have been given to the old-fashioned sounds and catheters, and to bougies, which were used at an earlier period, and these instruments have been improved in applicability by being manufactured of caoutchouc. The porcelain-tipped probe of Nélaton is an ingenious invention to determine the presence of metallic foreign bodies, particularly those of lead. The uterine sound of Kiwisch[1] is also an invention of our time. — When probes are ineffective, as where the skin is unbroken, we employ, besides the probe-trocar (e. g. of Wintrich, Sédillot and others) the so-called "akidopeirastische Apparat" of Middeldorpff, i. e. acupuncture needles of special form, used like probes, and which were brought before the profession in Günsburg's "Archiv" in 1856.

We should also mention here the universal employment of the thermometer for diagnostic (therapeutic and prognostic) purposes, in the mouth, rectum, axilla, vagina, and, indeed, the uterus, of all sorts of patients of all ages, a practice revived in our day by Traube, Felix von Bärensprung (1822–1864) and Wunderlich. Indeed this method is so thoroughly diffused that even from America P. F. Da Costa Alvarenga (died 1883) has excited some attention in Germany by a work on thermometry. Recently too Paul Niemeyer has used the thermometer, together with the hygrometer, barometer etc., for the purpose of hygienic, in contrast to clinical, diagnosis.

In France, after the example of Boerhaave, De Haën and others, and before the revival of the use of the thermometer by the Germans just mentioned, this instrument was employed by Goupil as early as 1798, and his example was followed by Piorry, Andral, Chossat, Monneret and others, though without rendering the thermometer so popular as it has recently become everywhere. Buniva as early as 1801 measured the internal temperature of the uterus, finding it more than 29° R. (97¼° F.)

[The thermometrical investigations of the Scotchman, George Martin (De similibus animalibus et animalium calore libri II., London, 1740), of the Dublin anatomist George Cleghorn (Treatise on the Diseases of Minorca, London, 1751) and particularly of James Currie (Medical reports on the effect of water, cold and warm, as a remedy in fever and other diseases, London, 1797), should be mentioned in this connexion. According to Haeser, Currie was the first physician to make any extensive use of the thermometer at the bedside Sir Humphrey Davy also determined the bodily temperature by the thermometer beneath the tongue in 1798.

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1. According to Schroeder the uterine sound was first employed by Levret as early as 1771. His example was followed by Chambon, Vigarous, Desormaux, Dance and particularly Samuel Lair (Nouvelle méthode de traitement des ulcères, ulcerations et engorgement de l' utérus, 1828). The practice was revived, and special sounds invented almost simultaneously by Simpson of Edinburgh (1843), Huguier of Paris and Kiwisch of Prague. H.

In the United States Dr. Elisha North published in 1808 a "Treatise on Malignant Epidemic Spotted Fever, or Cerebro-Spinal Fever", in which he tells us that it will be well always to ascertain the degree of the patient's temperature by a thermometer. The use of the thermometer, however, was not popularized in this country until after the appearance of Wunderlich's work in 1870, and the publication by Dr. Edouard Seguin (1812–1880) of New York of a "Medical Thermometry" in 1871. H.]

A novelty useful enough for scientific purposes, but readily dispensed with in practical life, is the "Sphygmography" introduced in the year 1863 by E. J. Marey of the Collége de France, the successor of Claude Bernard in his chair in the Académie. Marey's instrument was improved and named the "Angiograph" in 1872 by Leonard Landois, professor in Greifswald. Sphygmography labors under the objection that it does not show the qualities of the pulse appreciable to the touch only, and that it, like many of the methods now under consideration, relegates the exercise of the unaided senses to a position of obscurity. S. Th. Stein, a physician of Frankfort, has brought forward recently a photosphygmograph. [A "sphygmoscope" was invented by the ingenious S. Scott Alison of London, the inventor also of a "differential stethoscope", and the use of the sphygmograph has been studied and discussed in England by John Burdon Sanderson and Fred. A. Mahomed (1849–1884) of London, the latter best known for his enthusiastic exertions in the cause of the "Collective Investigation Society"; Balthazar Foster and James Sawyer of Birmingham.

In the United States the instrument has been discussed by Edgar Holden (The Sphygmograph: its Physiological and Pathological Indications, 1874 — the Stevens Triennial Prize Essay), who modified in some respects the instrument of Marey; Samuel B. Ward of Albany, N. Y., and Frank Woodbury of Philadelphia, who studied the American instrument of Pond. H.]

On the other hand, the simple counting of the pulse by the watch, a method which (particularly as the result of Louis' investigations) has become popular in our day everywhere, enjoys the advantage of demonstrating more satisfactorily any increase or diminution of the pulse-beat. A pulse-watch or "Angiometer" has been invented by L. Waldenburg (1837–1881), professor in Berlin.

Inspection and palpation, the oldest of medical methods of investigation, and which to-day too form the introduction to every diagnostic procedure, have met with some extension in our day. We need only mention the application of palpation to the investigation of the impulse of the heart, of peritoneal friction (Després, 1834), of vocal fremitus (J. Jos. Regnaud, 1816), of cardiac fremitus (the Author), and its more extended employment in gynæcology. Under this head belongs too the bold procedure of the Heidelberg surgeon Simon, who pushes his whole hand through the anus into the bowels, or presses his finger into the bladder, regardless of rupture of the sphincters. Such varieties of palpation, which should, at all events, be employed only in cases of extreme necessity, are only possible with the aid of the modern adjuvant, chloroform, discovered [independently in 1831 by Mr. Samuel Guthrie of Sackett's Harbor, N. Y., and] by Soubeiran in France, studied by Liebig and named by Dumas. [This agent was first employed by the method of inhalation in 1832 by Prof. Eli Ives of New Haven in a case of pulmonary disease, but its use as an anæsthetic is due to Sir James Young Simpson of Edinburgh, who in November 1847 employed it as a substitute for ether, and introduced it in this capacity to the profession.] Previously to this the dentist Horace Wells, of Hartford, Conn., had employed nitrous oxide, and had in 1844 discovered the anæsthetic effects of ether, a discovery which he communicated to the chemist Dr. C. T. Jackson (died 1880 in Somerville, Mass.) and the dentist W. T. G. Morton of Boston, both of whom claimed the discovery as their own, and at first employed ether as a secret remedy.[1] — A new means of inspection is the observation of the visible impulse of the heart, the palpation of which, like the investigation of the vocal fremitus and the friction sound in many cases of pericarditis, pleuritis and peritonitis, must in many respects be regarded as a novelty.

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[1] I have preferred to leave the text of this passage unchanged, as conveying to the American reader an idea of the views of an intelligent German physician in 1887 relative to the famous "ether controversy", which agitated this country about the middle of the present century. The facts of the case seem to be as follows:

Horace Wells in 1844 succeeded in demonstrating the *practicability* of surgical anæsthesia with *nitrous oxide*, though he failed to establish the *reliability* of the method. He seems in fact to have become disgusted with his want of success, and to have practically abandoned the subject for more than two years. He likewise essayed upon *himself* the effects of ether, but also gave up this agent because he found its inhalation too disagreeable.

The exhilarating and anæsthetic effects of ether were quite generally known for many years previous to its employment as a surgical anæsthetic. According to Dr. J. Marion Sims, a tumor was removed from the neck of a Mr. Venables by Dr. Crawford W. Long of Georgia on March 30, 1842, the patient having been previously placed profoundly under the influence of ether, and anæsthesia with this agent was employed by this same surgeon in other operations of later date, but prior to 1846. No account of these operations, however, was published until 1849, three years after Morton had introduced the method to the profession. Dr. Marcy of Hartford, Conn., is also said to have removed a wen from the head of a sailor under the influence of ether in January 1845, but though the patient became insensible and the operation was successful *per se*, Dr. Marcy yet advised Wells to stick to nitrous oxide as the safer and pleasanter anæsthetic agent. It was not until October 16, 1846, when Morton anæsthetized a patient in the Massachusetts General Hospital with ether for the removal of a tumor of the neck by Dr. John Collins Warren, that the *safety* and *reliability* of ether as an anæsthetic agent were fairly established and placed before the profession, and the merit of this demonstration is due entirely to the dentist W. T. G. Morton. Dr. Jackson claimed to have *suggested* the use of ether to Morton, but he never demonstrated its *safety* and *reliability*, and these were the new and decisive points which led to the general employment of ether as an anæsthetic. The first account of these operations under the influence of ether was published in the Boston Medical and Surgical Journal, Nov. 18, 1846. The new anæsthetic, under the title "Letheon", was patented conjointly by Morton and Jackson, but it was soon discovered that their letheon was nothing but pure sulphuric ether, and the patent came to nought. Wells committed suicide in 1848, Morton died of apoplexy in New York in 1868 and Jackson died insane in 1880 — sic transit gloria mundi! (H. G. Bigelow.) H.

From what has been said it will be seen that Diagnosis, the aim of all practical medical research at the sickbed, and the basis of thoughtful treatment, has been greatly promoted and facilitated in our day. The physician, as we know, must be at each instant so complete a master of this art — and often under what conditions! — that he is able to apply it instantly and effectively. By this facility, and the treatment founded thereupon, the practice of medicine, in spite of all efforts to degrade it into a mere trade, remains and will remain a true and genuine art!

4. SURGERY.

Surgery has always presented in its development a much pleasanter picture of steady progress than that offered by medicine proper, for its objects and its practice do not necessitate the illumination of dark paths by the torch of theory, which diffuses far more soot than light. Accordingly Chamisso calls surgery the seeing portion of the healing art. Thus too the surgery of our century, in accordance with the character of the people who have shared in its development, but unaltered by the opinions of schools and their often varying methods, has striven vigorously and steadily after a perfection based upon the foundation of experience, and for principles which the past, and particularly the 18th century, had taught. If the 16th century opened the way for the checking of hæmorrhage, and established this art in its scientific position, and if the 17th century accomplished the same results in the simplification and improvement of the art of dressing wounds; if too the 18th century gave a scientific elevation, so far as its means would permit, to both these methods, so in our own century surgery stands upon a scientific level with medicine proper, though its objects are far more accessible, direct and comprehensible than those of the latter science, and its position more favorable, so that its progress has been almost constant and uninterrupted. In full possession of the results of a normal, surgical and topographical anatomy, almost perfect in its development (a position which admits of both boldness and certainty in treatment), it has likewise been able to utilize in an eminently practical way the acquisitions of pathological anatomy, applying them as well to diagnosis as to operative and therapeutic aims. Of the advances in physiology too, and in the branches accessory to this science, it has been able to avail itself, without becoming a servant to that science and its methods. Microscopic pathological anatomy in particular has become of extended importance in surgical knowledge and practice. By it, above all, our knowledge of secondary wound-diseases, of the fate of the secretions of wounds and their effects upon the organism, of the character of the different forms of tumors and their methods of growth and diffusion etc., has been rendered clearer, and thus many fruitful facts and views have been contributed to surgical treatment. In addition to observations in pathological anatomy, numerous investigations relative to the process of healing, pursued upon accidental cases or upon wounds produced experimentally, upon operations on the lower animals etc., have inured to the advantage of surgery. Above all the external conditions of the healing process have been observed more attentively than in the entire past, and consequently the after-treatment of wounds, both local and hygienic, has been brought more into the foreground. Indeed this treatment, as the century has advanced, has become more and more careful, particularly in military surgery, a science which, as regards its methods and results, has been largely transformed by the improvements mentioned, by the better and more speedy transportation of the wounded through the invention of George Stephenson (1781–1848), and finally by the adoption of the barrack-system and the plan of distributing the wounded in numerous depots. Above all amputations, so frequent at an earlier date, have largely disappeared, and military surgery, as well as hospital and civil surgery, has inclined rather to the preservation of wounded parts and members, than to their removal. Thus has grown up to the scientific and rational, so-called conservative surgery of our century. Its establishment has been greatly aided by the science of statistics, which is of more decided importance in surgery than in medicine, because the relations and procedures of the former are more uniform and more readily inspected than those of medicine. A characteristic stamp has been impressed upon the surgery of our century by the bold and somewhat unexpectedly successful practice of visceral surgery, i. e. the surgery of the cavities of the body, from the ligation of the great internal vessels to the extirpation of ovarian tumors, the spleen, kidneys, larynx etc., a practice which contrasts strongly with that of earlier surgery, which was, on the whole, rather a surgery of the outer members, if such an expression is permissible.[1] In accordance with this conservative tendency of surgery, resections and decapitations (to which the invention of the chain-saw by James Jeffray in 1806 gave an impulse), rather than the earlier amputations and exarticulations, have been cultivated, and so far as Germany is concerned this practice was also introduced into military surgery by Bernhard von Langenbeck, Stromeyer and Esmarch. To resection was added the osteotomy of Bernhard von Heine (1800–1846) and A. Mayer in Würzburg, and the so-called subcutaneous osteotomy of B. Langenbeck (1854), performed by means of a drill and saw. Another great advance was the subcutaneous tenotomy introduced permanently into surgery by Stromeyer, who performed his first operation of this nature in 1831. We should also mention the improvement in plastic operations, among which should be counted the operation of osteoplasty introduced by B. Langenbeck in 1859. The operations mentioned, and other operative methods, some of them tedious and difficult, were certainly greatly facilitated, in fact almost conditioned, by the discovery of the anæsthetic effects of ether and chloroform, one of the most beneficent discoveries ever made. The rapid operations of an earlier date now disappeared, and instead of rapidity of method, the security of the patient and the certainty of success were now demanded. Pain was no longer the occasion for an avoidance of more tedious, but safer methods of procedure. Another advance in surgery, not so beneficent, however, in its results, was the rubber bandage of Esmarch, introduced in 1873 for the production of artificial anæmia. This invention, which, like almost all great inventions, was preceded by individual, though not methodical experiments, was anticipated by the revival of arterial torsion (Amussat, Thierry, Velpeau, and Fricke, all in the same year 1829), by more rapid methods of ligation, by compression and aplatissement, suture, acupuncture, galvano-puncture, injection etc., all of which combined to give to the surgeon the control of bleeding vessels. Pain and hæmorrhage, the greatest antagonists of the humanely thoughtful and sensitive surgeon, by the two methods mentioned were not, indeed, put entirely out of consideration, but assumed in operative methods the position of only incidental factors. The local anæsthesia of Benj. W. Richardson (1866) also serves to control pain, while écrasement, brought forward by E. Chassaignac (1858), and the use of the galvano-cautery introduced by A. Th. Middeldorpff in 1854, are directed against hæmorrhage. On the other hand, the actual cautery, the moxa etc. faded from sight more and more, to be replaced in many respects by electrolysis, introduced by Nélaton (1864), and the massage of Mezger.

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[1] Much extravagance has been displayed on this subject, and particularly in Germany less attention has been devoted not infrequently to the final result than to the temporary success in the operation. But operations should be only the means of restoring health, not simple measures for self-aggrandizement, and the permanence of the success should be looked to more frequently than is often the case. [In the United States too the well-known formula "The operation was entirely successful, but the patient — died" meets the eye more frequently than is becoming in a humane profession.]

Among the operative procedures of permanent value, Lithotripsy, an operation known even to the Byzantine physicians, and for which instruments were invented by Sanctorius, was practised by Antonio Ciucci of Arezzo in the 17th century, but its permanent introduction into practice was due to Gruithuisen, Civiale (1820), Heurteloup, Leroy d'Étiolles and B. Stilling.[1] Orthopædic surgery, or subcutaneous tenotomy, was introduced by Delpech in 1816, but it was first practised systematically by L. Stromeyer (1831), and popularized in France particularly by Jules Guérin, although Sir Astley Cooper and Dupuytren, by their division of the fasciæ and muscles, had suggested the principles of this branch. On the other hand, the so-called "Heilgymnastik" of Ling, the "Streckcuren" of Jac.

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[1] In this connexion the "Lithotrity by a Single Operation", introduced to the profession by Prof. Henry J. Bigelow of Boston in 1878, deserves notice as an improvement which has met with prompt and deserved recognition by surgeons both at home and abroad. H.

von Heine etc. have proved to be of merely ephemeral importance. Neurotomy and neurectomy were studied as special methods by Schuh, A. Wernher, Nussbaum (nerve-stretching, 1872) and others, and the cavity of the larynx was rendered accessible to surgical treatment by Bruns. An advance of the most humane importance is found in the improvement of the operation for vesico-vaginal fistula by Jobert de Lamballe (1852), by the late Gustave Simon, Bozeman and others, as the result of which success in the operation is the rule instead of the exception, as was the case before their day.[1] Even the greatest operative procedures, like ovariotomy, by the aid of improved methods and more modern principles of after-treatment, have been conducted to success by Spencer Wells (in 1877 he had performed ovariotomy 800 times), Koeberlé and others. On the other hand, ligation of the great vessels, which was frequently undertaken at the beginning of the century, particularly during the study of the collateral circulation, is now abandoned.

The use of animal fibres, e. g. catgut, for sutures, introduced by Sir Astley Cooper and Philip Syng Physick,[2] the suture with Carlsbad needles and the lead suture[3] of Dieffenbach in operations upon the palate, the silver wire suture of J. Marion Sims (1857), the iron-wire suture of Simpson (1859), the horse-hair suture of Simon etc., are some of the novelties in the suture line introduced into surgical practice. Collodion[4] was employed in effecting sutures by B. von Langenbeck and Burow, the so-called serres-fines were recommended by Vidal (1849), and the early removal of sutures was revived by Bruns. Finally the antiseptic method has recently found a special application even to the material of ligatures.

As regards bandages, the introduction of plaster of Paris by Larrey, (1824), Eaton,[5] C. A. F. Kluge and Dieffenbach (the principles for its employment were set forth by F. L. Froriep as early as 1817), at first attracted little attention in general practice, until the Dutchman A. Mathijsen (1805–1878, died in Hanover) brought forward in 1852 the use of the gypsum bandage. After this the plaster bandage was employed entirely too extensively until recently, when surgeons are beginning to avoid it. It was always actively opposed by Stromeyer. The starch bandage introduced by Louis Jac. Seutin (1793–1863) of Nivelles in 1840, like the gutta percha bandage of Uytterhoeven in 1851 and the water-glass bandage of A. Mitscherlich, was never so generally employed. Bonnet introduced wire-splints, others adopted metal splints etc., as the support for the dressings.

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[1] Vidal de Cassis as late as 1839 declared : "I do not believe that there exists in the science of surgery a well authenticated complete cure of vesico-vaginal fistula". The procedure of Jobert de Lamballe has been almost entirely superseded by that of J. Marion Sims and its modifications. Sims's method was published in 1852, and the "button suture" modification of Nathan Bozeman was brought forward in 1856. Simon's work appeared in 1854. H.

[2] Dr. Physick used strips of French kid. H.

[3] The subject of metallic ligatures was studied by Dr. H. S. Levert of Mobile, Alabama, while a student under Dr. Physick in Philadelphia, and his conclusion as to their innocuous character was published in the American Journal of the Medical Sciences in 1829. Dr. Warren Stone of New Orleans is believed to have been the first to apply a wire ligature to a human artery in 1859. H.

[4] Collodion was first applied to surgical purposes by Mr. J. Parker Maynard, a student of medicine in Boston, in 1847. H.

[5] Eaton was the English consul at Bassora and author of "A Survey of the Turkish Empire", London 1798. H.

In the treatment of wounds, while the greatest cleanliness and constant ventilation occupy the first place, permanent cold irrigation was brought forward by Rognetta, A. Bérard, Velpeau and others, instead of the cold dressings, which required constant change. On the other hand, B. von Langenbeck (born 1810) proposed permanent baths of warm water for the extensive wounds of amputation. The most attention and the most extended approval, however, have been aroused by the antiseptic dressings of Sir Joseph Lister, first of Glasgow, then in Edinburgh, in 1869 the successor of Syme and since 1877 professor in King's College, London. This dressing is based upon the employment of carbolic acid discovered by Runge in 1834. It has awakened in Germany, as well as elsewhere, the parties known as Antiseptists and Aseptists. By the aid of Wells's (?) anæsthesia, Lister's dressing and Esmarch's bandage, the surgery of our century is able to conduct operations to a successful termination without pain, without suppuration and without bleeding — a result never heretofore accomplished, and indeed scarcely thought possible.

That a large number of new operative methods and numerous improvements in the instrumental apparatus of our highly developed surgery and surgical technics have appeared, is a matter of course.

Many forms of disease have been better differentiated, and new forms discovered or rediscovered.

Among the individual departments of surgical science, general surgery and the theory of tumors have certainly in our century experienced the most extensive and fundamental changes and advances. Next to these we may rank military surgery, with the railroad transportation of the wounded after the American example, the barrack-system, also first extensively used in America and the decisions of the Geneva Convention, brought into existence by Henri Dunant in 1864.

In our day, however, ophthalmology, otology and dentistry have detached themselves from general surgery still more than heretofore, so that these branches are studied and practised as entirely distinct departments. Although too modern specialism has developed least in the direct line of surgery, yet specialists in surgery taken from the ranks of thoroughly educated physicians (in place of the half-educated surgeons of an earlier day) could certainly only elevate the art of operative surgery, which, in contrast to the past, is involved, on the whole, but little in general practice. For surgery, besides natural gifts, demands in particular more special, technical knowledge, education and dexterity, than the average overburdened general practitioner in Germany can acquire.

If surgery has accordingly gained infinitely in the intensity of its scientific study, the operative practice of surgery has lost its extensive cultivation in our century, since even in periods of war it is almost exclusively the coryphæi of surgery who have opportunity to gather operative experience. Hence it results that eminent surgical practitioners, particularly operative surgeons, of whom there were not a few among the surgeons of the olden time, have become at the present day almost a rarity.

This state of affairs is evidently also partially a result of the extremely antiquated methods of instruction in the theory of operations which prevails almost everywhere, according to which the student can only exceptionally learn by actual practice how to open a furuncle or an abscess, while operative practice on the cadaver, which occasionally bores even the teacher, likewise awakens no interest in the pupil, and gives exercise to no skill other than that of mechanical cutting and sawing, a practice the taste for which has been already exhausted by anatomical dissections. All exercises upon the living body, indeed every imitation of practice upon the living, are lacking, and prominently among these the practice of venesection.[1]. Yet these examples of actual practice might readily be exhibited, if—with few exceptions—old habits and convenience did not oppose the custom and permit nothing more to be done than had been done by our forefathers, and if a pupil was not loooked upon as a troublesome adjunct to the position of teacher. But from mere observation no one can acquire presence of mind and dexterity, as Dieffenbach especially has emphasized, and that the practising physician, in the absence of these qualities, often suffers injury in his whole subsequent career, is frequently to be laid to the charge of his almost entirely theoretical instruction.

At the beginning of the century

a. The French,

who naturalized pathological anatomy in modern surgery and have ever been distinguished as surgeons by their fertility of invention, dexterity in operating, eloquence in demonstration, excellence in observation and skill in determining the indications of the case, but in a less degree for their after-treatment, were the recognized leaders in surgery. The foundation of this preponderance was laid by the labors of the great Desault, and upon this foundation his successors continued to build. From the school of Desault descended the barber-surgeon

ALEXIS BOYER (1757–1833), of Uzerches in Limousin,

made a baron by Napoleon, and an eminent teacher and surgical author, who did not neglect the advances made by foreign authorities. He was a professor in the Charité, first surgeon of the emperor and author of a work in eleven volumes entitled "Traité des maladies chirurgicales et des operations, qui leur conviennent", Paris, 1814–26, which survived numerous editions—the fifth edited by his son Philippe—and several translations.[2] Boyer enjoyed the reputation of extreme soberness and of the most careful observation. He laid great weight upon the after-treatment, and in

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1. Consult "J. H. Baas, "Neue Methode der Operationsübungen an Leichen", 1867.
2. It was partially translated by our own countryman, the eminent surgeon Alexander Hodgdon Stevens (1789–1869), and published 1815–1828. H.

operating placed more importance upon the safe employment of the means already possessed, than upon boldness and the invention of new methods.

Before and contemporary with him, at the beginning of the present century, lived the following eminent representatives of French surgery: Jos. François Louis Deschamps (1740–1824) of Chartres, surgeon to the Charité, who, among other things, advocated resection in cases of complicated fractures; Pierre Lassus (1741–1807), professor in the École de Santé (Traité élémentaire de médecine opératoire, 2 vols., 1794); Desault's successor, Philippe Jos. Pelletan[1] (1747–1829), teacher in the École pratique, the Collége de Chirurgie and the Hôtel-Dieu (removed with A. Dubois in 1828), author of a "Clinique chirurgicale etc."; Pelletan's assistant in the Hôtel-Dieu, Bruno Giraud (died 1811) of Dampierre, and finally Lallement (died 1830), chief surgeon of the Salpêtrière.

The "Vitalist"

Balthasar Anthelme Richerand (1779–1840) of Bellay in Ain, made a baron like Boyer, was professor of surgery in Paris and a rival of Dupuytren, though far behind him in ability. His character suffered so greatly from ambition and vanity that, quite in contrast with his surgical contemporaries, he showed himself often dogmatic and ungrateful. By this conduct he seriously injured the influence of his scientific activity, and, in spite of constant restlessness and brilliant natural gifts, he was never able to obtain permanent popularity. Richerand also advocated better after treatment. His "Nosographie et thérapeutique chirurgicales", 3 vols., 1805–6, was a famous work in its day.

The third surgeon honored with the rank of baron under the empire,

Jean Dominique Larrey (1766–1842) of Baudéan in the department of Hautes Pyrénées, Surgeon-in-chief to la grande armée, was recognized and admired above all others, as well for his character — Napoleon I., who, like Bismarck, had great respect for surgery, but less for medicine, called him the most virtuous of men — as for his services to surgery. As Napoleon, in spite of his constant wars, was able to accomplish noble work in the departments of administration and justice, so Larrey, notwithstanding his continual campaigns, found leisure to write a large number of important works. In character he was good-natured, eternally busy and full of philanthropy and self-sacrifice.

Larrey had studied in Toulouse under the direction of his uncle Alexis Larrey, and in 1787 was appointed a navy-surgeon. This position, however, he gave up in order to continue his education in Paris for 3 years under Desault. In the year 1792 he joined the Army of the Rhine, and on this occasion invented the so-called "ambulances volantes". For the next 22 years, until the battle of Waterloo, Larrey continued to share in the campaigns of the Republic and the Empire, participating in 60 great battles and 400 engagements, during which he was himself wounded three times. He died in Lyons while on a tour of inspection. The Bourbons left him in his position as well as his offices, and after his death three statues to his memory were erected in France. — His chief works were entitled: "Dissertation sur les amputations des membres à la suite des coups de feu etc."; "Relation historique et chirurgicale de l' expédition de l' armée d' Orient en Égypte et en Syrie"; "Mémoires de médecine militaire et campagnes"; "Recueil de mémoires de chirurgie"; "Clinique chirurgicale exercée particulièrement dans les camps et les hôpitaux militaires depuis 1792 jusqu' en 1829"; "Mémoires" on yellow fever and cholera, on penetrating wounds of the chest etc. His son Hippolyte Larrey is also a member of the Académie de Médecine and an eminent surgeon still living in Paris.

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[1] Lassus and Pelletan made the post mortem upon the body of Louis XVII, as the records prove, and found the cause of his death to be neglect or scrophulosis. Pelletan took the heart home with him, but it was stolen by his pupil Tillos and never returned to him until the death of the purloiner in 1817. It was then entombed in St. Denis.

Larrey was as eminent a surgeon as he was experienced as an operator. Among other operations he performed disarticulation of the hip-joint (already practised twice on the same person by the Surgeon La Croix of Orleans in 1748), and executed 200 amputations in a single day. He was too the chief advocate of primary amputations etc. A wonderful organizer in affairs pertaining to military surgery, and a humane and indefatigable physician, he was idolized by the soldiers and honored by Napoleon and most of the French surgeons. He was likewise the medical witness of the most famous epoch of French history! Larrey still held the moxa in great esteem and called it his "bonne amie", while he was also partial to cold dressings.

None of the numerous military surgeons of this epoch rivalled Larrey in reputation. Next to him, besides Percy, who has been mentioned before, stood perhaps: Baron Nicolas Heurteloup (1750–1812) of Tours; Louis Seb. Saucerotte (1741–1814) of Luneville, who revived the theory of contre-coup, brought forward by Paul Ammann in 1674; Joseph Noël (1753–1808), professor at the Val-de-Grâce and then in Strassburg; Boizot and Benezeck, whose place was taken by Larrey; Dupont; Thomassin; Lagrésie; Étienne Billard Sr. (1730–1808); Mathieu Laurent Michel Manne (1734–1806), who wrote a famous work on the diseases of the bones; N. P. Gilbert (1751–1814); Pierre Duret (1745–1825), who was the first surgeon after Littre to successfully perform the operation for the formation of an artificial anus; Pierre Louis Delaporte (1773–1853), who, after Abernethy, tied the external iliac artery; J. A. Fleury (1758–1835), not to be confounded with the hydropathist L. J. D. Fleury, who with Lubanski introduced the Priessnitz treatment into France and gave it a rational form; and others.

The most brilliant and fortunate French surgeon of our century, equally famous as a keen diagnostician, bold and dexterous operator, fluent and untiring clinician and teacher, a physician cautious in his after-treatment, a master and yet prudent in his determination of the indications, an enlightened physiologist, well-versed in normal and pathological anatomy — in a word a man endowed with rare gifts for his profession, was unquestionably the baron

Guillaume Dupuytren (1777–1835) of Pierre-Buffière in the department of Haute Vienne, who in 1815 became the successor of Pelletan. The professor of operative surgery and physician-in-chief of the Hôtel-Dieu, he maintained until his death the predominance of French surgery, and collected and instructed an immense number of talented pupils, not only from France, but also from foreign lands and particularly from Germany In his day he rendered special service to our knowledge of the subject of fractures (particularly complicated fractures) and dislocations and their treatment, to that of the subcutaneous division of muscles and the resection of the facial bones, both of which operations he was the first to perform; to the explanation of the entrance of air into the veins, the theory of cysts, enterotomy, the subject of amputation etc. It was through his labors that pathological anatomy was first utilized in surgery, and he introduced the division of tumors (according to the simple macroscopic view) into homœoplastic tumors, i. e. those corresponding to the normal tissues, and heteroplastic, or those depending upon abnormal tissue-formation.

Dupuytren was the son of a poor lawyer, and, like many other of the famous French surgeons, beginning life in want, he studied in poverty and died in wealth. At the age of three years he was stolen by a wealthy lady of Toulouse, who was charmed by his eminent beauty. His father, indeed, brought him home again, but at the age of twelve delivered him to an officer, who took him with him to Paris in order to have him educated. After the completion of his preliminary education, he was encouraged to study medicine by Thouret, who, as we have already seen, introduced vaccination into France, and by his uncle, the famous Girondist, Vergniaud. Poor as he was, Saint Simon thought he might find in him a follower, but was disappointed in his expectations. Dupuytren devoted himself at once with fervent zeal to anatomy, and as early as his eighteenth year was given the position of prosector. In 1801 he was made demonstrator of anatomy in place of A. M. T. Duméril, and in this position he laid the foundation of the famous Musée Dupuytren. He also devoted attention to physiology, and founded in 1803 the short-lived Société Anatomique. At the same time he applied for the position of a surgeon of the second class in the Hôtel-Dieu, and under the protection of Boyer won the place in in opposition to Roux, Tartra, Hédeloffer and Maygrier. With the same perseverance which he had heretofore displayed in the study of anatomy he now devoted himself to surgery. In 1808 he was appointed adjunct superior surgeon to the Hôtel-Dieu, and in 1812 professor of operative surgery, in opposition to Roux, Marjolin and Tartra. Three years later he was appointed first surgeon of this hospital, and he continued to hold this position, with constantly increasing reputation, until the time of his death. In spite of his enormous activity in the Hôtel-Dieu — in the year 1808 he had the charge of 2353 patients, 368 of whom he operated upon, to say nothing of the treatment of 178 cases of fracture and dislocation, and the opening of 300 abscesses — and his didactic lectures, to which he devoted three hours a day, he yet attended to a private practice which extended all over France, so that he finally devised in his will a fortune of 4–7 millions of francs, and was able to offer the exiled Charles X. another million. Before his death, in addition to other legacies, he gave 200,000 francs to establish a chair of pathological anatomy, to which he nominated Cruveilhier. This legacy, however, was subsequently devoted to the establishment of the anatomical museum which bears Dupuytren's name. In the year 1833 Dupuytren was visited by a slight stroke of apoplexy. He then made a visit to Italy, where he was treated like a prince, and subsequently attended several bathing-resorts, without, however, giving up his duties in the Hôtel-Dieu. Two years after this attack he died of empyema. He had intended to be operated upon by Sanson, but finally refused the operation, saying that since death was inevitable he would rather die at the hands of God than of man. His funeral obsequies were those of a prince. — His chief works were: "Leçons orales de clinique chirurgicale faites à l'Hôtel-Dieu de Paris, edited by Brierre de Boismont and Buet, and subsequently by the former and Marx; Traité théorique et pratique des blessures par armes de guerre", edited by A. Paillard and Marx, with various "Mémoires".

Dupuytren, "The Napoleon of Surgery", possessed great ambition, and drew upon himself the enmity of many by his persecution of everyone who might in any way become his rival.

Contemporary with him, and his rival in ability though not in fortune and brilliant characteristics, was

JACQUES MATHURIN DELPECH (1777–1832) of Toulouse, the first strictly scientific student and cultivator of orthopædic surgery in France. In the latter capacity he performed in 1816 the first subcutaneous tenotomy of the tendo Achillis. He was likewise the pioneer of autoplastic surgery in France.

Delpech studied in his native city and was a pupil of Alexis Larrey, though he received his doctor's degree in Montpellier. To enlarge his education he went to Paris, where he taught by day and devoted his nights to private study under the pressure of many privations. In 1812 he was appointed a professor in Montpellier, where he erected, at his own expense, a large orthopædic institute, in which, so far as his other professional duties would permit, he devoted himself to this new department of surgical practice. While on his way to this institution, he, as well as his coachman, was shot by a patient upon whom he had operated for varicocele, and who thought that through Delpech's indiscretion he was prevented from contracting marriage. The bodies of both victims were dragged by the frightened horses to the gates of the institute. Delpech's chief works were entitled: "Mémoire sur la complication des plaies et des ulcères connue sous le nom de pourriture d' hôpital", 1815; "Chirurgie clinique de Montpellier", 1823–28; "De l' orthomorphie" etc., 1829.

A surgeon of no less reputation and no less merit, famous as a dexterous and rapid operator, was

PHILIBERT JOS. ROUX (1780–1854), of Auxerre, Dupuytren's successor in the Hôtel-Dieu.

His labors on the subject of resections, particularly resection of the elbow-joint, and on that of staphylorraphy and plastic surgery, were of especial importance.

JACQUES LISFRANC (1790–1847), of Saint Martin, physician to the Hôpital de la Pitié,

was the first to apply physical investigation to surgery, and to assume, and strive to secure for this science complete precision. He invented new methods for disarticulation of the shoulder (in conjunction with Champesme, 1815), for amputation between the tarsus and metatarsus, which had been performed by William Hey in 1803 (though not brought forward as a special method), for amputation of the cervix uteri, resection of the lower jaw, lithotomy in women (through the vestibulum vaginæ, in front of the urethra) etc. He was an extremely skillful operator, and particularly a rapid operator (flap amputation from without inwards). His chief works were: "Clinique chirurgicale de l' Hôpital de la Pitié", 3 vol., 1841–43; "Précis de médecine opératoire", 3 vol., 1845–47.

Surgeons of less importance were:

PIERRE AUGUSTIN BÉCLARD (1785–1825) of Angers,

who was best known as an anatomist, while his son Jules Béclard (1818–1887), professor in Paris, distinguished himself as a physiologist (Traité élémentaire de physiologie humaine etc., 1855; De la chaleur produite pendant le travail de la contraction musculaire; Précis d' histologie etc.)

JEAN NICOLAS MARJOLIN (1770–1850) of Ray in the department of Haute Saône,

physician to the Hôpital Beaujon, a better teacher than operator:

CHARLES MAINGAULT (died 1840) of Paris,

who published in in 1822 a famous "Médecine opératoire etc.", with life-sized plates of the various operations:

LOUIS JOS. SANSON (1790–1841) of Paris,

a favorite of Dupuytren, whom he succeeded in the surgical clinic at Paris. A keen observer, eminent diagnostician, important operator (he proposed recto-vesical incision for vesical calculus in 1815), and popular teacher and practitioner, in consequence of chronic ill-health he died so poor that the expense of his burial was defrayed by subscription:

GERMAIN JULES CLOQUET (1790–1883) of Paris, physician to the Hôpital St. Louis, professor of surgery, fellow of the French Académie and a Baron.

He was an extremely fruitful writer on anatomy — he published a magnificent atlas — pathological anatomy, hernia, operative surgery, worms etc.

The name of

JEAN CIVIALE (1792–1867) of Thiezac, in Paris, has become famous from its association with the re-invention of the beneficent operation of lithotrity, to which attention was first directed in our century by

the already mentioned Gruithuisen in Munich and Amussat, and for which the first instrument was invented by Leroy d'Étiolles. This instrument, however, did not answer the desired purpose, and the first actual lithotrity was performed by Civiale[1] with his "Litholabe" in 1824. The operation was opposed by Larrey, Sanson, Velpeau and others. Among the well-known lithotomists were Souberville (after the method of Frère Côme), Gillard (the high operation) etc.

JEAN ZULIMA AMUSSAT (1796–1856) of Saint-Maxent in the department of Deux-Sèvres,

a physician of Paris, acquired especial fame by his re-invention of torsion of the arteries, a method indicated by the Ancients, according to Haeser, but which has been approved and preserved in the case of small arteries alone. Amussat was also a champion of powerful and long-continued taxis in strangulated herniæ, of cauterisation in hæmorrhoidal tumors etc. Like L. Aug. Mercier (inventor of a straight catheter with a short curve), he popularized the practice of catheterism with straight catheters. Amussat was never a professor in the university, but he held at his residence so-called "Conférences", which were attended by the most famous physicians of his time, e. g. Sir Astley Cooper, Dieffenbach, Langenbeck etc. In 1878 a statue in his honor was erected in his native place. — His son Alphonse Amussat

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[1] His original idea was to dissolve the calculi chemically, but he was convinced by Thénard of the impossibility of this method. He then proposed merely to break off fragments of the stone, so as to determine its chemical nature. His "Litholabe" consisted of two straight metal tubes fitting each other, the inner of which terminated in three elastic arms, closed by retraction into the outer tube. If the stone was seized, an iron rod from without was rubbed forcibly against the knob.

(1821–1878) also distinguished himself as a surgeon, devoting himself particularly to the development of the galvano-cautery.

The Baron Charles Louis Stanislas Heurteloup (1793–1864) of Paris, inventor of the "Percuteur courbe à marteau" and the artificial leech, and

Ludwig L. Jacobson (1783–1843), ordinary physician to the king of Denmark,

were also engaged in the invention of instruments for the performance of lithotrity. Both presented their apparatus to the Académie in the year 1831. Recently

Charles Gabriel Pravaz (1791–1853) of Pont de Beauvoisins, a surgeon of Lyons,

has won a name often mentioned, particularly in the science of therapeutics, by means of his syringe, originally designed for the injection of chloride of iron into vascular tumors in order to effect coagulation of their contents. With the same object he also employed the electric current in 1834.

Auguste Vidal (1803–1856) of Cassis, physician to the Hôpital du Midi in Paris

and a pupil of Moullaud of Marseilles, became the earliest guide of many in the study of surgery by his "Traité de pathologie externe et de médecine opératoire", 5 vols., 1838–41, subsequently edited in German by Bardeleben and frequently reprinted in both France and Germany down to very recent times.

One of the most celebrated surgeons as well as wealthiest surgical practitioners in Paris — he left three millions of francs — was

Antoine Jos. Jobert de Lamballe (1799–1867) of Matignon in the department Côtes du Nord.

Starting from the deepest poverty and laboring under the sternest necessities, he finally became a professor and a member of the Académie. He was an extremely zealous surgical writer (Traité théorique et pratique des maladies chirurgicales du canal intestinal, 1829; Sur l'invagination et les sutures intestinales; Des plaies d' armes à feu, 1833 etc.), and an operator of merit, particularly in the cure of vesical fistulæ and lesions of the uterus. In his "Traité des fistules vésico-utérines" etc., 1852, of 147 cases he reports 82 cured, 27 improved, 26 deaths and 12 unimproved. — The eminently practical and famous Paris surgeon,

Alfred Armand Louis Marie Velpeau (1795–1868) of Brèche,

a pupil of Bretonneau and in 1834 successor to Boyer as professor of clinical surgery, was a popular teacher and fertile author, who devoted his attention to pure midwifery as well as surgery. His earliest writings related to midwifery and the history of development (Traité élémentaire de l'art des accouchements etc., 1829, often reprinted; Embryologie ou ovologie humaine etc., 1833). Before the appearance of the latter work he published his "Nouveaux élémens de médecine opératoire", 3 vols., 1832, while his last work was a treatise on diseases of the breast and the mammary region (1853).

Pierre Nicolas Gerdy (1797–1856) of Loches,

like Velpeau descended from poverty, but from 1833 a professor in Paris, acquired reputation particularly by his activity in the study of bandaging (Traité des bandages et appareils de pansement, 1826); as well as by the so-called radical operation for the cure of hernia by means of invagination of the skin of the scrotum and stitching in place the fold of integument formed upon the finger and pushed up against the abdominal ring. He likewise discussed the subject of resections.

Philippe Fréderic Blandin (1798–1849) of Aubigny, the successor of Richerand as professor of operative surgery,

was a distinguished practitioner and operator.

We should also mention here

P. Fr. Moreau and his son, of whom the father performed in 1792 the first total resection of the elbow-joint, while the son in 1816 published his own and his father's experience.

A surgeon of a reputation as extensive as well-founded was

Amédée Bonnet (1802–1858) of Amberieux in the department of Ain, physician to the Hôtel-Dieu in Lyons, who rendered important service to surgery by his treatment of diseases of the joints with immovable dressings, i. e. by fixation of the diseased joints. His "Traité des maladies des articulations" appeared in 1845, with several later editions. Bonnet also performed enucleation of the bulb, without removal of the ocular muscles (1842).

Less known outside of France than the surgeons already mentioned, were: P. A. Béclard (1785–1835); Ulysse Trélat at the Charité; Jean Jos. Reynaud (1773–1842); Jean Bapt. Joach. Clémot (1776–1852); Jean François Reybard (1790–1863), thoracocentesis (1841); Achille Cléophas Flaubert (1784–1846) of Mézières, professor in Rouen; Louis Mathurin Fouillioy (1790–1848); G. Goyrand (1803–1866, subcutaneous excision of loose cartilages in the joints); D. G. Belmas; Pouteau of Lyons, Demeaux, who did good service in the study of hernia, Stanislas Laugier (1799–1872) of Paris, Roux's successor; Auguste Bérard (1802–1846), of Varsins in the department of Maine-et-Loire, also in Paris, brother of the physiologist Pierre Honoré Bérard (1797–1858); Louis Jacques Bégin (1793–1859) of Liège; Robert Jos. Henri Scoutteten (1799–1871) of Lille, who wrote on hydrotherapeutics, exarticulation of the foot between the astragalus and os naviculare and cuboides, the oval method of amputation etc.; Jean Bapt. Lucien Baudens (1804–1857) of Aire (Baudens' method of amputating the foot, of resecting the shoulder etc.) His "Clinique des plaies d'armes à feu", 1836, and "Mémoires" on strangulated hernia and the ice-treatment of wounds widely diffused his name. — The Belgian

Jules Guérin (1801–1886) of Boussy, who must not be confounded with Alphonse Guérin of the Hôtel-Dieu (author of the occlusive wadding dressing), has obtained great reputation as one of the earliest orthopædic surgeons and the proprietor of the orthopædic institution at Passy. He practised tenotomy, and we have from his pen a very good compendium of operations.

Besides Guérin and Delpech, who has been already mentioned, Henri Bouvier (died 1877, Bouvier's corset), member of the Académie and an eminent physician of children, Tavernier, Duval, Lachaise and others devoted themselves to orthopædic surgery.

The most learned among the modern French surgeons,

Joseph François Malgaigne (1806–1865) of Charmes-sur-Moselle, professor of operative surgery in Paris from the year 1850, in addition to surgical anatomy, operative surgery, experimental surgery, the surgery of fractures and dislocations etc., also devoted his attention to the history of his branch. Malgaigne as a practitioner and operator was not a man of very considerable importance, but he was an extremely active and fruitful surgical author. His chief works were: "Traité d'anatomie chirurgicale et de chirurgie expérimentale", 1838; "Manuel de médecine opératoire", 1834 (8th edition by Léon Le Fort, 1875); "Oeuvres complètes d'Ambroise Paré", 3 vols., 1840; "Essai sur l'histoire et la philosophie de la chirurgie", 1847, and "Traité des fractures et des luxations", 1842–1855. On the other hand the "Surgeon of the Second Empire",

AUGUSTE NÉLATON (1807–1874), of Paris,

body-surgeon to Napoleon III. (his physician-in-ordinary was Conneau, 1803–1877), wrote but little, and was eminent particularly as a surgical practitioner. His reputation became world-wide through the invention of his ingenious probe, by which he detected the presence of the musket-ball in the body of Garibaldi. His extremely flexible catheter of vulcanised caoutchouc was improved and patented by Jacques. Nélaton was made an officer of the Legion of Honor in 1866, and a Senator of the empire in 1868. His only important writings were a "Traité des tumeurs de la mamelle", 1839, and "Éléments de pathologie chirurgicale", 5 vols., 1844–60. Another famous surgical practitioner of Paris was

JULES NICOLAS DEMARQUAY (1814–1875) of Longueval in the department of the Somme,

who also held the chair of a professor. Demarquay distinguished himself also as a hygienist and an authority in dietetics, and it was through his influence that the Esmarch bandage became popularized in France. His chief writings were entitled: "Des tumeurs de l'orbite", 1853; "Essai sur une pneumatologie médicale", 1866; "Sur les blessures", 1861; "Sur la gangrène du penis", 1870; "Sur le traitement de tétanos" 1871; "Sur l'ostéomyélite", 1872 etc.

Pierre Salomon Ségalas (1792–1875) of St. Palais, was an eminent and busy practitioner in Paris. — Philippe Boyer, like the younger Larrey, did all honor to the name of his father, though he did not nearly rival the latter in reputation, while conversely the younger Paul Louis Benoit Guersant (1800–1869), whose father, a contemporary of the elder Boyer, remained unknown, rendered himself famous by his treatise "Notices sur la chirurgie des enfants", 1864–67. The names of Charles Pierre Denonvilliers (1808–1872) and J. F. Jarjavay (1819–1868), professor of clinical surgery in Paris (Des opérations applicables aux corps fibreux de l'utérus, 1850), also extended beyond the limits of their native country, and the same may be said of Eugène Follin (1823–1867) of Harfleur, who devoted his study chiefly to ophthalmoscopy and the ophthalmoscope (Traité élémentaire de pathologie externe, 1862, continued by his friend Simon Duplay). In special circles the following surgeons likewise attained fame: M. A. Jamain (died 1862); César Alphonse Robert (1801–1861) of Marseilles, professor in Paris; Jos. Gensoul (1797–1858; partial resection of the jaw, the first in our century in 1825) in Lyons; Adolphe Lenoir (1802–1866) of Meaux, surgeon to the Hôpital Necker in Paris; Louis Marie Michon (1802–1860) of Blangy, president of the surgical society in Paris; A. D. Valette, professor in Lyons (invagination in hernia); F. M. G. Roustan; Pierre Charles Huguier (1804–1873), the inventor of the hysterometer; Morel-Lavallée (1811–1865); Auguste Liégeois (died 1871); L. Jos. Bauchet (1826–1865); Auguste Richard (died 1872); Laborie and Em. Foucher (died 1867). Karl Heinrich Ehrmann (1792–1878), professor of anatomy and surgery (the latter, as well as midwifery, was united with the chair of anatomy until 1836) in Strassburg, should be mentioned here from the fact that he performed in 1844 the first laryngotomy for laryngeal polypus. Dr. Alexandre Canquoin (1795–1881) of Dijon was the inventor of the chloride of zinc paste, which bears his name. — Considerable fame as an operator and a surgical writer was acquired by Ch. E. Sédillot (1804–1883, professor and member of the Académie) in Strassburg, through his subperiosteal resections and his Traité de médecine operatoire, bandages et appareils", a work published in conjunction with L. Legouest and often reprinted. E. Chassaignac (1805–1879) has been already mentioned as inventor of the écrasement linéare, and we also owe to him the modern system of drainage in surgery by means of tubes of caoutchouc (1859), though the same plan was employed by Hippocrates, Celsus, Gui de Chauliac, Paré, Brunschwigk and others. Chassaignac likewise described solution of the epiphyses of bones (called by him bone-typhus, ostéomyélite essentielle, and by Wernher osteochondritis epiphysaria, which, however, had been already discussed by the German Reichel in the 18th century. The name of J. D. Soupart is associated with the operation of amputation with four flaps. Bernard and Huette furnished a well-known "Traité de médecine opératoire". — Among the French surgeons of the present day the most famous are: J. G Maisonneuve (born 1809); Fred. Bouisson and Serre in Montpellier; L. Ollier in Lyons; L. Gosselin at the Charité; J. E. Pétrequin (1808–1876) in Lyons (galvanopuncture in aneurisms, 1845); Aug. Adolphe Reynaud; H. F. Dolbeau (1831–1877): Louis Alfred Richet with A. Guérin and Cusco at the Hôtel-Dieu in Paris; Terrillon and Benj. Anger at the Hôpital St. André; Just Marie M. Lucas-Championnière, an earnest follower of Lister; Jules Péan (laparotomy, extirpation of the spleen; resection of the stomach in 1879, before Billroth): Paul Ollivier; Ch. Sarazin; Léon Clément Voillemier (1809–1878); Joachim Giraldès (1808–1875); J. L. Reverdin, professor in Geneva (transplantation of skin upon ulcerated surfaces, (1872);[1] Paul Broca (1824–1880), senator etc., surgeon to the Hôpital des Cliniques, an eminent anatomist, anthropologist and surgeon, who proposed anæsthesia by means of hypnotism or staring at a glittering point. This method had been made known by the English physician James Braid of Manchester (1841) and Esdaile in Calcutta (1852). Broca also gave his name to the so-called "Broca's convolution", the third left frontal convolution of the brain, which he designated as the seat of the faculty of articulate speech. His chief works were: "Traité des anévrismes et leur traitement", 1856; "Traité des tumeurs", 1863; "Atlas d'anatomie" with Bean and Bonamy He published in all about 300 writings. We should also mention Aristide Verneuil (established the first successful gastric fistula in man) at the Hôpital de la Pitié, where Léon Labbé also labors; Tillaux at the Hôpital Lariboisière; Felix Guyon and Désormeaux at the Hôpital Necker; also Eugène Boeckel in Strassburg (galvanocaustic) and E. Koeberlé, the famous ovariotomist (Résultats de statistique de l'ovariotomie, 1868), in spite of their originally German names, should be counted among the French surgeons. Jules Rochard, chief physician of the French marine and a morbid revancheur, whom we have followed chiefly in the preceding catalogue, has distinguished himself as an author on marine surgery and a skilful historian of modern French surgery (Histoire de la chirurgie française au dixneuvième siècle. Paris, 1874). He admits the decadence of French surgery in the second half of our century, but thinks the Germans have stolen their ideas from the French, very much as the French populace, educated and uneducated, after the war of 1870–71, thought the German soldiers had stolen all their clocks. In reply to Billroth's declaration that French surgery at the present day is behind the age, Verneuil recently (1888) protested that the French merely operated less frequently than some other nations, were more conservative and especially more cautious in undertaking bold operations of doubtful result — a reply which contains considerable truth.

Among the surgeons of French Switzerland Matthias Mayor in Lausanne (simplification of the dressing of wounds and cathétérisme forcé etc.) and Charles Théophile Maunoir, professor in Geneva, were particularly prominent.

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[1] Prof. Frank H. Hamilton (1813-1886) of Buffalo, N. Y., as far back as 1847 proposed the operation of skin-grafting in the Buffalo Medical and Surgical Journal, and a full account of a successful case performed by this surgeon may be found in the New York Journal of Medicine for 1854. (Gross.) H.

b. The Italians,

after the time of Scarpa, never obtained a decided influence upon the surgery of our century, although they possessed good surgeons in great abundance. Almost all of them, however, contented themselves with following the lead of other nations. The best known Italian surgeons were probably Luigi Porta (1800–1875), professor in Pavia, and Aloysio Vanzetti (born 1809) in Padua, the latter famous for his digital compression of arteries in the treatment of aneurism, a disease whose operative treatment has always been a favorite subject of study with Italian surgeons. Giov. Batt. Monteggia (1762–1815; Instituzioni di chirurgia, Milan, 1802); P. Mariano in Padua; G. Regnoli; Cesare Ruggieri (1768–1828) in Padua; Federigo Pajola in Venice; Emiliani in Faënza, who performed ovariotomy in 1815, after it had been already done by Robert Houston[1] in Glasgow in 1701, by l'Aumonier in Rouen in 1781, and by Ephraim McDowell of Danville, Kentucky in 1809, were likewise eminent surgeons. We should also mention: de Negri; Zanetti; R. Gritti; Luigi Ciniselli in Cremona (1805–1879), who advocated galvanopuncture even in aneurism of the aorta; Bruno in Turin, ordinary physician of King Victor Emmanuel; Pasquale Landi in Siena: Domenico Peruzzi; Enrico Bothini in Novara; Federico Allesandrini in Chiari; Luigi Amabile in Naples (Transplantation of skin after Reverdin); Panizza; F. Palasciano, Cl. Romano in Naples; A. Riberi in Turin; Tizzoni (amputation with a periosteal flap); del Greco in Florence; Cipriani (died 1883) professor in Rome; Albanese, the surgeon of Garibaldi in Palermo; F. Rizzoli (died 1880) in Bologna (osteoclast 1847, etc.), who exercised great influence upon modern Italian surgery and left the colossal fortune of six millions of francs for the maintenance and extension of a model orthopædic institute, upon which, during his lifetime, he had already expended two millions; Durante; Prandina; Signorini (1797–1844) in Padua, who recommended an intro-retroversio cornata or çhilissochisorafia (what a barbarous name!) as a radical procedure in hernia, and performed in 1842 the first total extirpation of the lower jaw; P. Mariano in Padua; Constanzo Mazzoni (1825–1885), a famous teacher and operator, president of the Supreme Board of Health in Rome, and a surgeon well informed in the history of his art; Francesco Cortese (1801–1883) physician of the general staff in the Italian army, also of Rome etc. — Among the eminent Italian ophthalmologists were Giovanni Battista Quadri (1780–1851), professor in Naples, and Francesco Flarer in Pavia, both very famous pupils of the school of Beer in Vienna; Giovanni Baratta (Osservazioni pratiche sulle principale malattie degli occhi, Milan 1818) and Antonio Quaglino (born 1817), a famous ophthalmologist of Pavia.—At the beginning of the century Italian surgery inclined partly to the Vienna school and partly to the Parisian or French. The latter was entirely the case with the surgery of the

c. Spanish,

who, since the time of Gimbernat, have been able to point to no surgeon whose services have been sufficiently important to arouse any continued attention in foreign countries.

On the other hand, Spanish surgery has recently displayéd a lively interest in the advances of foreign lands, and particularly those of France, and we will merely mention by name here some few of the Spanish surgeons who have developed and presented their surgical experience in the journals after the modern style: Creus: Vincente Urquiola (lithotrity); Augustin Maria de Ovieto (perineal section); Santiago Garcia Vasquez; Antonio Romero Linares; Gonzalez Olivarez in Valladolid; Pascual Candela y Sanchez; Maria Augusto Llacayo y Santa etc. There is also in Spain no lack of reports of cases published in the journals. Spanish ophthalmology until a short time ago belonged chiefly to the sphere of the Saints, particularly to St. Lucia, and it is only recently that human specialists, mostly pupils of the French school, have taken possession of this department. Among these we may mention particularly Jago Delgado (1830–1875) in Madrid. — To judge from the number of students, we should expect to find the condition of medicine in Spain very flourishing. In 1877-78, in the almost incredible number of 49,287 students of all departments, we find 21,620 students of medicine and 2,530 of pharmacy.

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[1] The ovariotomies of both Houston and Laumonier were accidental, or at least incidental to other operations, and not deliberately planned and executed as primary operations. The first deliberate and intentional ovariotomy proper was performed in 1809 by Ephrain McDowell of Kentucky, of whom we shall speak hereafter. (H.)

d. The English.[1]

The proper creators of the so-called conservative surgery (inaugurated by Henry Park and Charles White), with Sir Astley Cooper at their head, at once, like the French, utilized the results furnished by pathological anatomy. In this they were powerfully influenced by the example of their own great investigators in this department, John Hunter and Matthew Baillie. The advances in physiology and pathology were likewise equally utilized in practice. Equally inventive with the French, and bolder when necessity demands, not fond of novelties, but rather firm in their attachment to tradition, the surgeons of England are less showy in word and resolution, than quiet and sober in both these directions. Yet in execution they are prudent and calm. Then too the most careful local and dietetic treatment, as well as a particular attention to the hygienic management of the case, were very early regarded in English surgery as a portion of the surgeon's duty at least as important as, and frequently surpassing in importance, the performance of the operations themselves. In this point of view modern surgical practice owes to the English, and particularly to Lister, the greatest practical advances, which far outweigh in the beneficence of their action the American discovery of anæsthesia and the German invention of Esmarch's bandage. The fact that English surgeons have not abandoned, so strictly as the German, the practice of medicine proper, also lends to English surgery a partially medical character, if such an expression may be used.

The most celebrated representative of English surgery in our century was unquestionably

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[1] In the collaboration of the sections on English and American medicine in the 19th century it has been judged wisest to avoid disfigurement of the page by the introduction of numerous brackets to indicate precisely the additions and alterations of the translator. As, however, the author has given the translator a *carte blanche* to remodel them as seemed best in his judgment, it is but just that he should also assume the responsibility of all errors and omissions in these sections. (H.)

Sir Astley Paston Cooper (1768–1841) of Brooke in Norfolk, surgeon to Guy's and St. Thomas's Hospital in London and ordinary surgeon to George IV. and Queen Victoria.

Cooper, a man endowed with all graces of person, was the fourth son of a clergyman in good circumstances, who instructed his own children. At the age of 14 he removed with his parents to Yarmouth, where the following incident determined his choice of his profession. One of Cooper's comrades fell from a wagon and injured his femoral artery in such a way that all his other playfellows, terrified by the profuse bleeding, ran away. Cooper, however, remained by him and resolutely bound his handkerchief firmly about the bleeding limb, so that time was gained for the arrival of a surgeon, who then undertook ligation of the wounded vessel. From that moment Cooper embraced the plan of becoming a surgeon, and accordingly at the age of 15 he became an apprentice to the apothecary Turner in his own town. In his 16th year, however, he left this position in order to study in London under the direction of his uncle William, who was surgeon to Guy's Hospital. Soon after he associated himself with Cline at St. Thomas's Hospital, and three years later — in 1787 — he went to Edinburgh. From Edinburgh he returned to London, delivered lectures, and after some failures in the beginning, finally became a more popular lecturer than any teacher before or since his time. Having married in 1791 a relative of Cline, he made a trip to France for scientific purposes, and, on his return, began an extensive private practice, which brought him in annually about £21,000, so that he died a millionaire.[1] In 1821 he was made a baronet. In 1828 he married a second time, but left no children by either wife. A year previous to this marriage he had been appointed surgeon to the king. Subsequently Cooper withdrew from his position as a teacher, but enjoyed no long rest, and died with asthmatic troubles at the age of 73 Bright and Chambers were his attending physicians. His body is entombed in the chapel of Guy's Hospital, and a monument to his memory was subsequently erected in St. Paul's.—Sir Astley Cooper was a fertile author. His chief works were: "The Principles and Practice of Surgery", London, 1824–27; "The Anatomy and Diseases of the Breast", 1829; "The Diseases of the Testis", 1830; "On Dislocations and Fractures", 1822 etc. — Cooper's motto was: "We should first observe and then think." Brodie in his memorial address for Cooper said he was one of the most influential and most popular of men, always manifested an unfailing zeal for his profession, could never be unoccupied, and united good-heartedness and charitableness with a practical knowledge of mankind. "Probably the time is no longer remote when it will be a question whether Cooper was an expert operator or not. This much, however, we must all certainly acknowledge, that his published writings will be studied by physicians also as long as surgery continues to be practised." To this A. Lee adds, "He was not only a distinguished surgeon, but a thoroughly good man in the best and strictest sense of the term."— Cooper's boldness in operation, a quality which astonishes us, though its advantages are often doubtful (and the same is still more true of certain modern operators), is evidenced by the single fact that in 1817 he was the first surgeon to tie the abdominal aorta. The operation was performed upon Charles Hudson, a doorkeeper of Parliament, and the patient nevertheless survived 48 hours. Cooper in 1801 performed the first paracentesis of the membrana tympani.

A colleague of Cooper's at St. Thomas's Hospital, as well as his first pupil, was Benjamin Travers, who has been already mentioned. Travers was associated with Sir Astley Cooper in the publication of the "Surgical Essays" (1818), was appointed Surgeon Extraordinary to the Queen in 1837, Surgeon-in-ordinary to Prince Albert in 1840 and Serjeant Surgeon to the Queen in 1857. He devoted much attention to the treatment of diseases of the eye, and we owe to him the popularization of the administration of mercury in iritis, both simple and specific. Among his best known works were his "Observations on the pathology of venereal affections", 1830; "An inquiry into that disturbed state of the vital functions, usually denominated constitutional irritation", 1824; "Principles and practice of opthalmic surgery", 1839. He died March 6, 1858.

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[1] Jeaffreson says: "The highest amount Sir Astley received in any one year was £21,000. This splendid income was an exceptional one. For many years, however, he achieved more than £15,000 per annum." (H.)

Frederick Tyrrell (1797–1843), a nephew and pupil of Sir Astley Cooper, was a surgeon distinguished as a diagnostician and operator, and particularly eminent as an ophthalmic surgeon. He also edited "The lectures of Sir Astley Cooper on the principles and practice of surgery, with additional notes and cases", London, 1824–27, and wrote, among other works, "A practical work on the diseases of the eye and their treatment, medically and by operation", 1840.

Eminent surgeons before the time of Tyrrell were: Sir William Blizard (1743–1835), surgeon to the Magdalen and London Hospitals, and the first to tie the superior thyroid artery for the cure of goitre; John Clarke (cauliflower excrescence); John Cunningham Saunders (1773–1810), founder of the London Ophthalmic Infirmary in Moorfields, a quarter of London; Alexander, of the Royal Infirmary for Diseases of the Eye, a famous ophthalmic surgeon who declared instillations of extract of belladonna a specific against iritic adhesions etc.; John Walker of Manchester, author of "The principles of ophthalmic surgery" etc., London, 1834; Arthur Jacob (1790–1874) of Dublin (membrana Jacobi, 1819); Phipp; Prichard (first enucleation of the bulb for sympathetic ophthalmitis in man, 1851); Mac Keown in Belfast, who in 1874 extracted a fragment of steel from the interior of the eye by means of a magnet etc. In fact until very recent times almost all the famous English surgeons were also oculists of skill. We may further mention:

Joseph Henry Green (1791–1863), a nephew of Cline and colleague of Sir Astley Cooper at St. Thomas's Hospital, who, besides his skill in surgical diagnosis and his operative dexterity, distinguished himself as a good physician and anatomist.

Other distinguished surgeons of Guy's Hospital during the present century were: Charles Aston Key (1810–1849), a pupil of Sir Astley Cooper, well known as an accomplished operator, who e. g. tied the subclavian artery in 14 minutes; John Morgan (died 1847), a very skilful operator. Both the surgeons mentioned were contemporaries with Cooper. Among the more recent surgeons of this hospital are: John Hilton (1804–1878), Surgeon-extraordinary to the Queen; Thomas Bryant (Practice of Surgery); John Birkett; Arthur Edward Durham; G. H. Howse.— At St. Thomas's Hospital we find Frederick le Gros Clark, Sir William Mac Cormac (born 1836), Surgeon-in-chief of the Anglo-American Ambulance in 1870–71, whose "Notes and recollections of an ambulance surgeon", 1871, were translated into German by Stromeyer; John Simon, the famous Medical Officer of the Board of Health, and subsequently of the Privy Council; Sidney Jones; Mr. Wagstaff etc. Among its earlier teachers were John Flint South (1797–1882), who translated and improved Chelius's "Handbuch der Chirurgie" (1847); Macmurdo; Samuel Solly (1805–1871) and Campbell de Morgan (1813–1876).

The name of Cooper is also favorably known through Samuel Cooper (1781–1848), professor of surgery in London and surgeon to the University Hospital, at an earlier period a military surgeon, whose "First lines of the practice of surgery", 1807, "Treatise on the diseases of the joints", 1807, and "Dictionary of practical surgery", 1809, were all popular works. Bransby Blake Cooper (1792–1853), the nephew and adopted son of Sir Astley Cooper as well as his biographer, likewise contributed to the eminence of the name, though he was less celebrated as an operator than as a teacher and author. He was surgeon to Guy's Hospital, and author of "Surgical essays etc.", 1833, "Lectures on anatomy etc.", 1829–32.

The following physicians and surgeons bearing the name of Cooper are also known: Gerard Cooper in New York; James Cooper in Norwich; John Cooper in Liverpool; Langston Cooper in Lexington; Thomas Cooper Jr., in Philadelphia. Robert Cooper and Thomas Cooper Sr., were of an earlier date.

SIR BENJAMIN COLLINS BRODIE (1783–1862),
professor of anatomy and surgery in the Royal College of Surgeons, surgeon-in-chief to St. George's Hospital and ordinary surgeon to Queen Victoria, is usually regarded as a surgeon of the first rank. He was an extremely zealous observer — he kept a record of all his important cases from the beginning of his career — a distinguished surgical investigator and a practitioner eminent for his security in operating. He was also an eminent anatomist, pathological anatomist and physiologist. His after-treatment was very simple. We find evidence of Brodie's calmness and the clearness of his observation in the fact that, basing his action upon statistics, the older he became, the less frequently he operated. His chief works were: "Pathological and surgical observations on diseases of the joints", 1818; "Lectures illustrative of certain nervous affections", 1837; "Lectures on diseases of the urinary organs", 1832, and various lectures on important subjects in therapeutic and operative surgery, introductory lectures delivered in the hall of the Royal College of Surgeons etc.

A colleague of Brodie's in St. George's Hospital and a famous operator and practitioner was Thomas Rose. Later surgeons to the same hospital were: Robert Keate, Serjeant-Surgeon to Queen Victoria (1837); Cæsar Hawkins (1798–1884), the most eminent representative of an eminent medical family, finally consulting surgeon to St. George's and, after the death of Brodie, Serjeant-Surgeon to Queen Victoria; George Gisborne Babington (1795–1856); Catler, and still more recently G. Pollock, Sir. M. Prescott Hewitt, surgeon to the Prince of Wales and Surgeon-extraordinary to the Queen; Timothy Holmes of St. George's Hospital, whose great text-book of Surgery entitled "A system of surgery, theoretical and practical etc.", London, 1860–64, is similar to the work of Billroth and Pitha; Johnson; Thomas Tatum (1802–1879); J. Rouse; T. P. Pick; J. W. Haward and E. R. Rowland.

The famous military surgeon
GEORGE JAMES GUTHRIE (1785–1856),
professor of anatomy and surgery in the Westminster Hospital in London, might be called the Larrey of England, inasmuch as he accompanied Wellington upon all his

campaigns, as Larrey did Napoleon I. He also shared with Larrey many characteristics, above all those of operative ability and modesty. Like Larrey too he favored early operations, and with Thomas Rose and William Fergusson Sr. was a representative of the Portuguese or anti-mercurial treatment of syphilis. Guthrie was likewise an ophthalmic surgeon of ability. His chief works were: "A treatise on gunshot wounds, on inflammation, erysipelas. Being a record of the opinions and practice of the surgical department of the British army, at the termination of the wars in Spain, Portugal, France and the Netherlands, in 1814 and 1815", London, 1827, 6th edition 1855; "Lectures on the operative surgery of the eye" etc., 1823, etc.

Colleagues of Guthrie in the Westminster Hospital were the eminent surgeon James Wardrop (1782–1869), particularly known as an oculist and pathological anatomist of the eye (An essay on the pathology or morbid anatomy of the human eye, Edinburgh, 1808), who performed enucleation in sympathetic ophthalmitis: Sir James Mac Gregor (1771–1858) Surgeon-extraordinary to the Queen and Medical Director of the British army; Dr. Neil Arnott (1788–1874), the inventor of the hydrostatic bed, whose "Elements of physics etc.", 1827, ran through its first edition in a single week and by 1832 had enjoyed no less than five editions: Richard Anthony Stafford, an eminent practitioner, who introduced the first useful instrument for the internal division of strictures of the urethra (1828); Joseph Amesbury (1795– ?), who rendered good service by his study of severe fractures, false joints and their treatment; William Lynn (1753–1837); Sir Anthony Carlisle (1768–1840), an eminent anatomist, who studied the diseases of old age (1818). More recent teachers in the Westminster Hospital were Carsten Holthouse (born 1810); Brook; Hillman and Power. Holthouse and Hillman taught the principles and practice of surgery, Brook, descriptive and surgical anatomy.

At St. Bartholomew's Hospital taught Abernethy's pupil

SIR WILLIAM LAWRENCE (1783–1867),

surgeon of Queen Victoria, and highly esteemed as a diagnostician and operator. He was likewise acquainted with German surgery, and wrote many important works: "A treatise on ruptures" etc., 1810; "Lectures on surgery, medical and operative" etc., 1832; "A treatise on the venereal disease of the eye", 1830, etc.

To the same hospital belonged: Henry Earle (1789–1838), son of Sir James Earle (1755–1817), the latter the inventor of the treatment of hydrocele by injection (1791). Henry Earle invented a special fracture-bed, but was less famous as an operator than his father. John Painter Vincent also attained little eminence as an operative surgeon. After their day surgery was represented in this hospital by: Sir James Paget (born 1814), Serjeant-Surgeon to the Queen, an eminent pathologist and among the moderns the most important investigator of the subject of tumors (Lectures on surgical pathology: Lectures on tumors etc., 1851): Frederick Carpenter Skey (1798–1872), whose "Principles and practice of operative surgery", 1850, defends the principles of conservative surgery: Wormald; William S. Savory; Richard Holmes Coote (1817–1872);

Luther Holden; George William Callender (1830–1879) and Thomas Smith. — Among the teachers at the Charing Cross Hospital were the very learned T. J. Pettigrew (born 1791) and the famous surgeon John Howship (died 1841), author of "Practical observations in surgery and morbid anatomy etc.", London, 1816, with numerous other works. Their places have been recently taken by Henry Hancock (1809–1880) and Canton. The present professor of surgery at the Charing Cross Hospital Medical School is Mr. Barwell.

JOHN LIZARS (1783–1860),

professor of surgery in the University of London and subsequently in Edinburgh, and a pupil of John Bell, distinguished himself as a bold operator and a zealous and fertile surgical writer. As early as among the twenties of the present century he had performed several times extirpation of the ovary, and had treated chronic hydrocephalus by operation. Among his more important works were "Observations on extirpation of diseased ovaria" etc., Edinburgh, 1825; "A system of practical surgery", 1838; "Hydrocephalus chronicus treated by operation", 1821; "A system of anatomical plates" etc., 101 plates, London, 1822–26.

University College Hospital from its foundation to the present day has enjoyed a long line of eminent surgeons. We have already mentioned Samuel Cooper, and add the famous names of Robert Liston (1794–1847), who distinguished himself by his resections, particularly of the elbow joint (A treatise on practical and operative surgery, 1837); Richard Quain, Surgeon Extraordinary to the Queen, and with William Sharpey editor of the 5th edition of Jones Quain's Human Anatomy; John Eric Erichsen, author of "The science and art of surgery", a surgical textbook long famous in the United States and recently becoming popular in Germany; Thomas Wharton Jones (born 1808), a famous ophthalmologist; John Marshall (Outlines of physiology, human and comparative etc.", 1867), who lectures on operative surgery, and Christopher Heath (born 1835), author of numerous surgical treatises. To these should be added Berkeley Hill, surgeon also to the Lock Hospital, author of "Syphilis and local contagious disorders", 1868; "The student's manual of venereal diseases 1877, etc. The famous

SIR CHARLES BELL (1774–1842),

who has been already mentioned, and who was surgeon to the Middlesex Hospital until called in 1836 as professor of medicine to Edinburgh, distinguished himself as an operator, but was less popular as a practitioner. He was an opponent of vivisection. Among his more important writings were: "A system of operative surgery", London, 1807; "Institutes of Surgery etc.", Edinburgh, 1838; "Illustrations of the great operations of surgery, trepan, hernia, etc.", London, 1821, etc. The Bridgewater treatise entitled "The hand, its mechanism and vital endowments, as evincing design", London, 1834, is an ingenious and well-known work of this author.

Bell had as his colleague in the Middlesex Hospital the eminent physiologist and surgeon Herbert Mayo (died 1852), who became entangled in the toils of Mesmerism. Among their successors were Alexander Shaw, Charles Hewitt Moore (1821–1870) and T. Henry. The present surgeons of this hospital are John W. Hulke, George Lawson and Henry Morris.

The University of Edinburgh acquired great reputation from its professor of surgery James Syme (1799–1870), who deserves much credit for his introduction of resection into practice. His name is also preserved in operative surgery by his method of amputation through the ankle-joint (Treatise on excision of diseased joints, 1831), an operation for which in 1846 he was able to show 20 successes in 24 cases. The name of the older James Jeffray, professor of anatomy and surgery in the University of Glasgow, who, as already remarked, devoted considerable attention to resection, is preserved by his chain-saw (Cases of the excision of carious joints. By H. Park . . . . and P. F. Moreau . . . . with observations. Illustrated by engravings. Glasgow, 1806), while that of the Edinburgh surgeon and obstetrician Sir James Young Simpson (1811–1870), the inventor of acupressure, is indissolubly associated with the introduction of chloroform.

At the outset Simpson had to defend himself in all seriousness against the attacks of the English religious bigots, who seemed to regard his efforts to abolish suffering in surgical and obstetrical operations as a sin against the Holy Spirit. His chief work on this subject was entitled "Anæsthesia; or the employment of chloroform and ether in surgery, midwifery etc.", 1849. We owe to Simpson also the popularization of the uterine sound and the introduction of the sponge-tent for dilatation of the cervix uteri (1849).

Thomas Annandale and Joseph Bell should also be mentioned among the surgeons of the University of Edinburgh.

In Dublin Sir Philip Crampton (1777–1858), Surgeon-in-Ordinary to the King, obtained reputation by his performance of resection of the knee-joint as early as 1823. He also devoted much attention to the treatment of aneurism. Crampton's pupil, Rawdon Macnamara, surgeon to the Meath Hospital, has written "On the treatment of stricture by the immediate plan" etc., while Patterson in Glasgow performed gastrotomy several times for abdominal tumors. George H. B. Macleod, Regius Professor of Surgery in the University of Glasgow, was surgeon of the English army before Sebastopol in the Crimean war, and author of "Outlines of surgical diagnosis" (1864), with other works.

Thomas Blizard Curling (born 1811), surgeon to the London Hospital (1849), obtained great reputation in Germany by his excellent work on "Diseases of the Testis", 1843, and among his distinguished colleagues at this hospital were John Adams (1806–1877), Jonathan Hutchinson (born 1828), a prominent contributor to Holmes's "System of Surgery" and Reynold's "System of Medicine"; William John Little (born 1810), founder of the Royal Orthopædic Hospital, who was cured of club-foot by Stromeyer and introduced the practice of tenotomy into England (Treatise on club-foot and analogous distortions, 1839); Carr Jackson, and the eminent George Critchett (1817–1882). The latter was distinguished chiefly as an ophthalmic surgeon, and introduced into practice the methods of iridodesis, "re-adjustment" in the operation for strabismus, blepharotomy, scoop-extraction in cataract, abscission of staphyloma etc.

King's College Hospital, however, united in its Faculty a great number of the most important surgeons. Here Sir William Fergusson (1808–1877), Serjeant-Surgeon to the Queen, displayed his activity. Of him it was said that he had "the eagle's eye, the lion's heart and the lady's hand". His "System of practical surgery" appeared in 1842. With Fergusson were worthily associated John Wood, his successor in the chair of clinical surgery, which he now holds; Sir William Bowman (born 1816), Consulting Surgeon and Vice-President of the London Ophthalmic Hospital in Moorfields, and a successful cultivator of microscopic anatomy; Richard Partridge (1805–1870), an eminent teacher of anatomy, and Peter Charles Price (1832–1864), a distinguished representative of conservative surgery. For a time Sir Thomas Watson (1792–1882), President of the College of Physicians (1862–67) and Physician-in-Ordinary to the Queen, was attached to this school. Its present professors of surgery are Mr. Wood, Mr. Lister and Mr. Henry Smith.

Finally we mention as representatives of English military surgery: Sir G. Logan, Physician of the General Staff; Maclean, Surgeon General and professor of military surgery in the school at Netley; Edmund Alexander Parkes (1819–1876) of Warwick, a famous writer on military hygiene (A manual of practical hygiene etc., 1864); Joshua Henry Porter (died in Afghanistan in 1880), Deputy Surgeon-General; Thomas Longmore (born 1816), Surgeon General and Honorary Surgeon to the Queen, professor of Military Surgery in the Army Medical School at Chatham, and author of numerous treatises on military surgery and hygiene; Mac Kinnon, Deputy Surgeon-General and teacher of operative surgery in Netley; Gordon K. Hardie, who enjoys the same rank, and Surgeon-Major Becker of Aldershott. — We must also mention Sir Charles Locock (1799–1875), Physician-Accoucheur to the Queen, who officiated at each of her nine accouchements and received in 1857 the title of Baronet; Sir Henry Thompson (born 1820) in London, the eminent specialist in the surgery of the urinary organs, who performed lithotomy upon the emperor Napoleon III. (1873); Patrick Heron Watson, Surgeon-in-Ordinary of the Queen in Scotland; William Donald Napier, who improved the operation of lithotomy; Lund, professor in Owen's College, Manchester; William Coulson (1802–1877), an eminent specialist in lithotripsy and lithotomy; Alexander Ogston (born 1844), Regius Professor of Surgery in the University of Aberdeen (operation for genu valgum); and Sir Joseph Lister (born 1827), the successor of Syme in Edinburgh and of Fergusson in London, the inventor of the antiseptic treatment of wounds, of whom we have already spoken. Prof. Annandale, formerly Syme's assistant, succeeded Lister in Edinburgh.

Among the

e. Americans,

who, like their English kinsmen, have a special talent for surgery, and to whom modern surgery owes the great and enduring acquisitions of anæsthesia, the system of distributing the sick and the use of barrack hospitals, as well as the first great series of operations upon the cavities of the body (the 13 ovariotomies of McDowell), so characteristic of the surgery of the 19th century, we may mention:

JOHN COLLINS WARREN (1778–1856),

son of John Warren, the first professor of anatomy and surgery in Harvard College, who was for many years surgeon to the Massachusetts General Hospital and the most eminent operator in New England. He performed the operation of staphylorraphy in 1820, was the first surgeon to administer ether for the purpose of surgical anæsthesia, and probably performed the first successful operation of paracentesis pericardii. He was the founder (1828) of the Boston Medical and Surgical Journal, and the author of a treatise on tumors.

WRIGHT POST (1766–1828),

an eminent surgeon of New York, professor of surgery and subsequently of anatomy in Columbia College, who performed many creditable operations.

PHILIP SYNG PHYSICK (1768–1837),

a pupil of John Hunter, professor of surgery in the University of Pennsylvania in 1805, and called by Gross the "Father of American Surgery." He was one of the ablest physicians and surgeons of Philadelphia for many years, but left no works to preserve his fame. We owe to him the tonsillotome which bears his name, and which he presented to the profession in 1828, and we have already referred to his employment of animal ligatures (buckskin). The indefatigable and versatile

NATHAN SMITH (1762–1829),

a professor in Dartmouth, Yale and Bowdoin Colleges, and in his day perhaps the best "all round" medical practitioner of New England. He probably anticipated Brodie in the performance of trephining for the relief of abscess of the bone, an operation which Smith carried out in the latter part of the 18th century.

EPHRAIM MCDOWELL (1772–1830),

of Danville, Kentucky, whom the Americans[1] regard as the inventor of ovariotomy, though his claim is not justified by history, in spite of the fact that he received a statue as the first ovariotomist in 1877.

JOHN SYNG DORSEY (1783–1818) of Philadelphia,

a nephew of Physick, professor of anatomy in the University of Pennsylvania and the first surgeon in the U. S. to tie the external iliac artery. Dorsey's "Elements of urgery", Philadelphia, 1813, was the second surgical text-book published in this country, and enjoyed for many years a merited popularity. Its author was cut off at he early age of 35, just as fame was opening before him. The American surgeon whose name is best known abroad, however, and whose reputation is no less extensive n his native country, was

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[1] Not the Americans only. Carl Schroeder says: "Ephraim McDowell of Kentucky, however, was the first man to perform ovariotomy in a rational and deliberate manner. This he did in December, 1809, on the person of a Mrs. Crawford. The case was successful, and the patient died in 1841, at the age of 79 years. McDowell performed the operation thirteen times in all, and in eight of his cases the cure was complete.

"The honor of having been the first to perform ovariotomy in a methodical manner, for the radical cure of ovarian tumors, cannot be denied McDowell, although a few cases of accidental ovariotomies were recorded at an earlier date." See also note page 1041. McDowell's cases were first published in the "Eclectic Repository and Analytic Review" for April, 1817.

Valentine Mott (1785–1865) of New York,

a native of Glen Cove, Long Island. He was a pupil of Cooper, Abernethy and Bell, and yielded to none of his teachers in the boldness, brilliancy and success of his operations. Mott was professor of surgery in Columbia College and the College of Physicians and Surgeons, New York, 1809–1826, and again 1830–1840; in Rutger's Medical College 1826–1830, and in the New York University Medical College 1840–1860. He tied for the first time the arteria innominata in 1818, an operation which was repeated in 1830 by Dr. Richard Wilmot Hall of Baltimore, in 1859 by Dr. E. S. Cooper of San Francisco, and in 1864 by Dr. A. W. Smyth of New Orleans. The last case alone was successful in preserving the life of the patient. Gross says of Mott:

"No surgeon, living or dead, ever tied so many vessels, or so successfully, for the cure of aneurism, the relief of injury, or the arrest of morbid growths. The catalogue, inclusive of the celebrated case of the innominate artery, comprises eight examples of the subclavian artery, fifty-one of the primitive carotid, two of the external carotid, one of the common iliac, six of the external iliac, two of the internal iliac, fifty-seven of the femoral, and ten of the popliteal; in all one hundred and thirty-eight."[2]

Benjamin W. Dudley (1785–1870),

a pupil of Sir Astley Cooper, Abernethy, Cline, Larrey, Dubois, Boyer etc., who founded in 1817 the Medical Department of the University of Transylvania at Lexington, Kentucky, and was the professor of surgery and anatomy in this institution until its suspension in 1859. Dudley was to the United States west of the Alleghany mountains what Mott was to the East—*facile princeps.* He was a particularly successful lithotomist, and is said to have performed this operation 100 times in succession without a failure or a death. He employed the lateral operation exclusively, and was fond of using the gorget. Dudley was also a pronounced advocate of the use of the roller bandage, a partiality which in the hands of his less prudent pupils occasionally led to disaster. In 1828 he trephined the skull for the relief of epilepsy, probably the first operation of this nature performed in the United States.

George McClellan (1796–1847),

a bold and brilliant operative surgeon and popular teacher, who founded the Jefferson Medical College of Philadelphia and was its professor of surgery from 1825-1838. His "Principles and Practice of Surgery" was edited by his son Dr. John H. B. McClellan.

Reuben Dimond Mussey (1780–1866),

professor of surgery in the Ohio Medical College, 1838-52, and in the Miami Medical College, 1852-60. He was a bold and successful surgeon, and in 1837 removed the entire scapula and clavicle.

Thomas Dent Mutter (died 1859),

professor of surgery in the Jefferson Medical College of Philadelphia, who left his surgical museum to the College of Physicians of Philadelphia, together with $30,000 for its increase and the endowment of the "Mutter" lectureship in that institution.

J. Kearney Rodgers (1793–1857),
a pupil of Wright Post, Sir Astley Cooper, Abernethy and Sir Benj. Brodie, founder, with Dr. Edward Delafield, of the New York Eye and Ear Infirmary and surgeon to the N. Y. Hospital. In 1846 he tied the left subclavian artery between the scaleni, an operation which rendered him famous.

John Rhea Barton (died 1871),
an expert lithotomist, best known, however, from the operation devised and executed by him in 1835 for the relief of angular anchylosis of the knee. He was also the first to suggest the use of the bran dressing in the management of compound fractures, and has given his name to a fracture of the lower end of the radius, which he described.

William Gibson (1784–1868),
a pupil of Sir Charles Bell, who succeeded Physick in the chair of surgery in the University of Pennsylvania in 1818, and continued to hold this position until compelled by ill health to resign in 1854. He was the first surgeon to tie the common iliac artery, and published in 1824 "The Institutes and Practice of Surgery", a work which survived nine editions.

Alexander Hodgdon Stevens (1789–1869),
professor of surgery in the College of Physicians and Surgeons of New York and an eminent clinical teacher. He translated a portion of Boyer's surgery in 1815, edited Cooper's "First Lines of Surgery" in 1822, and published several original and valuable memoirs. Stevens was also one of the surgeons to the New York Hospital.

John Watson (1807–1862),
a native of Londonderry, but brought up from childhood in New York, one of the surgeons to the New York Hospital and founder in 1836 of an infirmary for cutaneous diseases, known as the Broome Street School of Medicine, in which he was associated with Dr. H. D. Bulkley. Watson was an excellent classical scholar as well as surgeon, and on his death left to the New York Hospital a valuable collection of the medical writings of the great physicians of Antiquity and the Middle Ages. His "Medical Profession in Ancient times", 1856, is a charming little work and leads us to regret that the writer was unable to pursue further that vein of activity in which he was so well adapted to succeed. As a surgeon he is best known as the first in this country to perform œsophagotomy for the relief of organic stricture of the œsophagus. The case was reported in 1844.

Amos Twitchell (1781–1850), of Keene, New Hampshire,
one of the ablest surgeons of New England, who in 1807 tied the primitive carotid successfully in a case of secondary hæmorrhage.

Dixi Crosby (1801–1873),
professor of surgery in Dartmouth College, who in 1836 removed the entire arm, including the clavicle and scapula, for an osteosarcomatous tumor.

Gurdon Buck (1807–1877) of New York,
surgeon to the New York Hospital and to St. Luke's and the Presbyterian Hospital in New York City, whose method of extension by means of strips of adhesive plaster and the weight and pulley, introduced in 1851, together with his success in autoplastic surgery, have rendered his name famous.

Samuel D. Gross (1805–1884),
professor af surgery in the Jefferson Medical College of Philadelphia, a fruitful writer, able surgeon and popular teacher, best known for his great "System of Surgery", which appeared in 1857 and has survived six editions.

Willard Parker (1800–1884), professor of surgery in the College of Physicians and Surgeons from 1839 to 1870, surgeon to the New York Hospital etc., a bold and independent surgeon and popular teacher, who revived in 1867 the method of incision into perityphlitic abscesses originally performed in 1848 by Mr. Hancock of London. and in 1846 performed for the first time the operation of perineal cystotomy for the relief of chronic cystitis depending upon hypertrophy of the prostate gland. He was also the first surgeon in America to ligate the common carotid and vertebral arteries after ligation of the subclavian, in order to prevent hæmorrhage from the anastomosing vessels.

James Rushmore Wood (1816–1882), who, in conjunction with Dr. Isaac E. Taylor and several other prominent physicians of New York, founded in 1861 the Bellevue Hospital Medical College in that city, and occupied the chair of Operative Surgery and Surgical Pathology in that institution until 1868. He performed most of the major operations of surgery, and particularly prided himself upon the removal of the entire lower jaw for phosphor-necrosis in 1856. In this case the jaw was reproduced from the periosteum.

Joseph Pancoast (1805–1882), who succeeded McClellan in the professorship of surgery in the Jefferson Medical College of Philadelphia in 1838, and was professor of anatomy in the same institution 1841–1874, an eminent surgeon who happily combined prudent caution with boldness and skill in operation. His well-known "Treatise on Operative Surgery" was published in 1844 and ran through several editions.

Frank Hastings Hamilton (1813–1886), professor of surgery in Bellevue Hospital Medical College, New York, 1862–1875, best known as one of the surgical attendants of the late President Garfield and author of a treatise "On Fractures and Dislocations", 1859, which ran through several editions and has been translated into various languages. His early practice of skin-grafting has been already noticed.

John Murray Carnochan (1817–1887), a pupil of Valentine Mott, and for many years professor of surgery in the New York Medical College which became extinct in 1864. Among the original operations of Dr. Carnochan his ligation of the femoral artery for the relief of elephantiasis of the lower extremity (1851), and his exsection of the superior maxillary nerve beyond the ganglion of Meckel (1856), have contributed most to render his name famous. He also exsected the entire ulna in 1853, Dr. Robert B. Butt of Virginia having exsected the lower two thirds of that bone in 1825. Carnochan wrote an able memoir on congenital dislocations of the hip-joint in 1850, and was the author of other valuable works on operative surgery.

Henry Berton Sands (1830–1888), professor of Surgery in the College of Physicians and Surgeons, New York, and Surgeon to the New York and Roosevelt Hospitals, whose celerity of thought, expression and action was only equalled by his accuracy and precision. As an operator Dr. Sands was distinguished by the conservative boldness and skill of a great practitioner, and by a conscientiousness which led him to avoid all operative measures of doubtful advantage. Unfortunately for the profession his busy life and untimely death deprived him of all opportunity for communicating the results of his rich experience to his colleagues, though a few able monographs attest the soundness of his judgment and the facility and accuracy of his pen.

Samuel W. Gross (1837–1889), professor of the Principles of Surgery and Clinical Surgery in the Jefferson Medical

College, Philadelphia, a worthy son of Samuel D. Gross, the eminent surgeon already mentioned. Dr. Gross was a learned, bold, and yet careful surgeon, and an eloquent and earnest teacher. He had made a special study of tumors of the breast, and his "Treatise on Tumors of the Mammary Gland", 1880, is probably his best known work.

J. Mason Warren (1811–1867) of Boston,

the son of John Collins Warren and himself an eminent surgeon;

Alfred C. Post (1806–1886),

a well-known and highly esteemed surgeon of New York.

Among our numerous excellent surgeons of more or less local celebrity we may mention George Hayward (1791–1863) of Boston; Richard S. Kissam (died 1822) of New York; Warren Stone (1808–1872) of New Orleans; Nathan R. Smith (1797–1877) of Baltimore, inventor of the well-known "anterior splint" for fractures of the leg and thigh; Josiah C. Nott (1804–1873) of Mobile, who exsected the coccyx for the relief of coccyodynia as early as 1832; Joseph Hartshorne (1779–1850), William E. Horner (1793–1853) of Philadelphia; Horace A. Ackley, of Cleveland, Ohio, who is said to have removed the entire lower jaw in 1850 for the relief of osteosarcoma; Paul F. Eve (1806–1877) of Nashville, Tenn., a skilful lithotomist and general surgeon and a popular teacher, whose "Collection of remarkable cases in surgery", 1857, is well known; John T. Hodgen (1826–1882) of St. Louis; Erskine Mason (1832–1882 of New York; George Alex. Otis (1830–1881), Surgeon and Brevet Lieut. Col., U. S. A., a pupil of Malgaigne, Civiale, Nelaton etc., and the lamented author of the unfinished "Surgical History of the War", 1870; Ernst Krackowizer (1821–1875), a native of Spital in Austria, but an eminent practitioner in New York; William H. Van Buren (1819–1883), James L. Little (1836–1885), both of New York; Joseph C. Hutchinson (1827–1887) of Brooklyn; Hazard A. Potter (1810–1869) of Geneva, N. Y.; Jacob Randolph (1796–1848) of Philadelphia, who in 1831 introduced the practice of lithotrity into the United States; Eli Geddings (1799–1878) of Charleston, S. C.; Daniel Brainard (1812–1866) of Chicago, inventor of the method of subcutaneous perforation of the bones in anchylosis etc. (1854); Horatio G. Jameson (1792–1856?) of Baltimore; George C. Blackman (1819–1871) of Cincinnati; Alden March (1795–1869) of Albany; Hugh Holmes McGuire (1801–1875) of Virginia; and George W. Norris (1809–1875) of Philadelphia.

Among the more eminent living members of the medical profession in the United States, who devote the most of their attention to surgery,[1] it will be sufficient to mention: Henry J. Bigelow of Boston, professor of surgery in Harvard University for thirty-three years (resigned in 1882), who performed in 1852 the first excision of the hip-joint in the U. S. and invented (1878) the method of "Lithotrity by a Single Operation"; John Collins Warren, also of Boston; Thomas M. Markoe, professor of surgery in the College of Physicians and Surgeons, New York; Stephen Smith, professor of clinical surgery in the University of the City of New York; Lewis A. Sayre, Prof. of orthopædic and clinical surgery in Bellevue Hosp. Med. Coll., N. Y.; Alexander B. Mott, son of the famous Valentine Mott, Prof. of clinical and operative surgery in Bellevue Hospital Medical College; Robert F. Weir, surgeon to the New York and Bellevue Hospitals; J. Williston Wright, professor of surgery in the Medical Department of the University of the City of New York; Lewis A. Stimson, Prof. of clinical surgery in the same institution; John A. Wyeth; Arpad G. Gerster; Frederick Lange; George A. Peters; William Detmold, Emeritus Prof. of Clinical and Military Surgery in the College of Phys. and Surgeons, New York, and the introducer of subcutaneous tenotomy into the United States; J. W. S. Gouley, William T. Bull, Fred. S. Dennis, Chas. McBurney, Chas. K. Briddon, Benjamin Howard, Joseph W. Howe, all of New York; Charles B. Nancrede, senior surgeon to the Episcopal Hospital etc., Philadelphia; W. H. Pancoast, Prof. of Anatomy, Jefferson Med. Coll., Philadelphia; J. Ewing Mears, Lecturer on Gynæcology in the same institution; D. Hayes Agnew, Prof. of Surgery in the University of Pennsylvania, Philadelphia; John Ashurst Jr., Prof. of Clinical Surgery in the University of Pennsylvania; W. W. Keen, Prof. of Surgery in the Woman's Medical College, Philadelphia; John H. Packard, Surgeon to the Episcopal Hospital, Philadelphia; Henry H. Smith, Emeritus Prof. of Surgery in the University of Pennsylvania; John H. Brinton, Prof. of Clinical Surgery in Jefferson Medical College, Philadelphia; Thos. G. Morton, H. Lenox Hodge and Addinell Hewson, all of Philadelphia; Julius F. Minor of Buffalo, N. Y.; Christopher Johnson and L. McLane Tiffany of Baltimore; Moses Gunn and C. T. Parkes of Chicago; Nicholas Senn of Milwaukee, Prof. of Surgery in Rush Medical College, Chicago, and inventor of the recent method of rectal insufflation of hydrogen gas in the diagnosis of gastro-intestinal injuries; C. H. Mastin of Mobile; Hunter McGuire of Richmond (tied the abdominal aorta in 1868); Joseph Ransohoff, P. S. Connor and T. A. Reamy of Cincinnati; Gustave C. E. Weber of Cleveland; E. M. Moore of Rochester, N. Y.; R. A. Kinloch of Charleston, S. C.; Duncan Eve, Nashville, Tenn.; T. G. Richardson of New Orleans; Frederick Hyde of Syracuse, N. Y., and numerous others.

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[1] Prof. S. D. Gross, writing in 1876, says "It is safe to affirm that there is not a medical man on this continent who devotes himself exclusively to the practice of surgery." (H.)

The history of the introduction of surgical anæsthesia has been already given on a preceding page, and the honor of this beneficent system duly assigned to its American authors.

The credit of the employment of collodion as a means of uniting wounds has also been accorded to John Parker Maynard, a medical student of Boston in 1848. His example was soon followed by Dr. Whitney of the same city, and then in Europe by Simpson and Malgaigne.

That the admirable barrack and distribution systems, as well as numerous improvements in the transportation of the wounded, are due especially to American physicians is well known. Thomas W. Evans, an American dentist residing in Paris, particularly distinguished himself as a writer on these subjects. (La commission sanitaire des États-Unis, son origine, son organisation etc., Paris 1865; History of the American ambulance established in Paris during the siege of 1870–71, London, 1873, etc.)

Recently J. Marion Sims (1813–1883) of New York (where he established in 1855 the Woman's Hospital) has again demonstrated the fact that American surgeons possess in an eminent degree the qualities of inventiveness and operative dexterity.

As German ophthalmology has found its representatives in Liebreich in London and George Frick in Baltimore, so also now it is represented in the United States by Hermann Knapp in New York and George Reuling in Baltimore.

The surgery of

f. The Germans,

which, until the second third of the present century, was largely tributary and subordinate to foreign surgery, particularly that of France, after this time developed rapidly and vigorously, so that, indeed, even the French of late acknowledge its superiority. This rapid development was chiefly due to the efforts of Kern, Graefe, who was the first to establish a surgical clinic in Berlin with ten beds, Dieffenbach, who demonstrated that German surgeons were able to rival the French in operative skill and boldness (Bergmann) as well as in elegance of writing, Stromeyer, B. Langenbeck and Esmarch. Kern became eminent for his simplification and improvement of the treatment of wounds; Graefe for his revival of plastic operations; Dieffenbach, for all his enthusiastic work and his genius. The most important service of Stromeyer consists in his extension of tenotomy to new departments, while with Langenbeck and Esmarch he embraced a conservative tendency, and thus opened new paths even in military surgery, by introducing into the surgical practice of the battlefield the system of resections before practised, especially in hospitals, by Textor and Jäger. Esmarch too, by his introduction of an artificial anæmia, has perfected a system both surgical and humane, the importance of which will probably not be fully appreciated until a future period. By this system he has levelled the road for physicians in general, enabling them, and showing them the way to operate well, by teaching them how the more easily to carry on the "bloody struggle for life and death", as Dieffenbach calls operative surgery, before which the majority of them recoil; "for it is less the dread of cutting than of its results, the bleeding," which appalls them, "and he who feels himself master of the hæmorrhage will manage the knife with unshaken hand." As the result of the advances mentioned, an operative heroism in cutting has arisen, a heroism which no longer pays sufficient regard to indications, prognosis etc., and endeavors to shine simply by manual dexterity.

One of the chief departments of German surgeons is general surgery, and the most important representative of this branch among the moderns was the prematurely deceased O. Weber (1827–1867), professor in Heidelberg, who fell a victim to diphtheritic infection contracted by sucking the larynx of a patient upon whom he had performed tracheotomy.

A great and extensive influence upon the course of surgery was acquired at the beginning of the present century by the famous professor of surgery in Vienna,

Vincenz von Kern (1769–1829) of Graz. This was the result as well of his eminent position in the grandest university of the day (which permitted and compelled him to educate many pupils), as of the spirit of his teachings, in which, following the traditions of the old Vienna school and particularly the doctrines of Stoll, he laid great weight on good observation and simple rational operative treatment, as well as medical management and after-treatment. Still more, he plainly declared the indivisibility of surgery and medicine. The after-treatment of wounds he simplified almost too much, contenting himself with merely dressing them with moist cloths.

Kern, like all surgeons who sprung from the 18th century, had pursued a surgical career from the ranks upward. In his travels, which in themselves formed undoubtedly an excellent means of education, he had visited many places, and had been in Salzburg, Trieste and Venice, and finally came to Vienna. From this city he went as ordinary physician to Hildburghausen, having obtained this position through the aid of Leber, an influential teacher of surgery who has been already mentioned. After the decease of his sovereign and patron, Kern visited France and Italy, and then studied medicine under Stoll, taking the degree of the doctorate. In 1797 he was appointed a professor in Laibach, and in 1805 became professor of practical surgery in the University of Vienna. With the assistance of Ad. von Stifft (1760–1836), the influential physician-in-ordinary, Protomedicus and Director of Instruction, Kern founded an institution for the education of operative surgeons, in which the latter were required to practise operations upon the cadaver, using even the very table employed in operations upon the living patients. This practice was continued down to 1867, when Billroth put an end to it. In 1824 Kern resigned his position. His principal works were entitled: "Die Leistungen der chirurgischen Clinik der hohen Schule zu Wien von 1805–1824", Vienna, 1828; "Annalen der chirurgischen Clinik zu Wien", 1807; "Anwendung des Glüheisens"; "Beobachtungen und Bemerkungen aus dem Gebiete der praktischen Chirurgie", 1828; "Abhandlung über die Verletzungen am Kopfe und die Durchbohrung der Hirnschale", 1829; "Avis aux chirurgiens" etc., 1809. In this latter work Kern recommends the open treatment of operative wounds, dressing them with simple cold compresses and, after the occurrence of union, with merely a few strips of adhesive plaster. If suppuration set in dressings of luke-warm water were to be employed. In contrast to the preceding abuse of salves and charpie which originated in the days of itinerant and empiric surgical practitioners, these principles were a decided reform. Kern regarded the access of air as wholesome, while according to Lister it is to be shunned like the plague.

A contemporary of Kern and a teacher at the Josephinum was

Chr. B. Zang, who enjoyed the reputation of a good operator. His principal work was entitled "Darstellung blutiger heilkünstlerischer Operationen", 1818–1824. Kern's successor in the University was

Joseph, Baron von Wattmann (1789–1866), a professor in Laibach, Innsbruck and after 1824 in Vienna, where he also held the position of surgeon-in-ordinary.

Von Wattmann was particularly famous as an operator, and acquired great favor and high esteem. He wrote among other works: "Ueber die Vorlagerungen in der Leistengegend", 1815; "Versuche zur Heilung des Noli me tangere"; "Sicheres Heilverfahren bei dem schnelleintretenden Lufteintritt in die Vene und dessen gerichtsärztliche Wichtigkeit", 1843; "Handbuch der Chirurgie", new edition 1848 etc. He also constructed a skeleton with joints united elastically so as to aid in the demonstration of luxations, and invented methods for the treatment of contraction of the urethra after amputation of the penis, for restoration of the nose, a cystotome etc.

Zang's chair in the Josephinum was taken after his death by

MICHAEL HAGER (1795–1857) of Transylvania,

professor of surgery and a teacher in the Institute for operative surgeons. His chief works were: "Die chirurgischen Operationen", 1831; "Die Anzeigen zu Amputationen, Exarticulationen und Trepanationen, die Nervenkrankheiten und die Auswüchse am menschlichen Körper", 1849, etc.

A pupil and assistant of Kern was the Prague surgeon

IGNAZ FRITZ (died 1843) a Croat,

whose last assistant and successor

FRANZ, BARON VON PITHA (1810–1875), of Rakom in Bohemia,

a pupil of Fritz, Krombholtz, J. G. Ilg and Jungmann, was from 1857 until its closure in 1873 a professor in the Josephinum at Vienna. On Dec. 29, 1875, after an illness of two years, he succumbed to the fate of his predecessor Huncowzky. Von Pitha is well-known from his participation in the editorship of the great "Manuals" of Virchow and Pitha-Billroth, to the former of which he supplied the article on "Krankheiten der männlichen Geschlechtsorgane", and to the latter that on "Die Krankheiten der oberen und unteren Extremitäten". In 1859 and again in 1866, at the wish of the Emperor, he officiated at headquarters as chief of the field medical service, and rendered himself chiefly useful in the development of military hygiene in Austria, doing away with the lower surgeons of the time of the Theresianum.

Although Pitha's activity was contemporary with the New Vienna School, the proper surgical representative of the latter, however, was

FRANZ SCHUH (1805–1865), of Scheibbs in Austria.

The assistant and successor of Wattmann, professor in Salzburg (1836), Primararzt in Vienna (1837), in 1841 extraordinary, and in 1842 ordinary professor of surgery and state-counsellor, Schuh introduced the microscope and the tendency to pathological anatomy into surgery, and was also an eminent operator. Besides minor writings in the journals, his chief works were entitled: "Die Erkenntniss der Pseudoplasmen", 1851; "Pathologie und Therapie der Pseudoplasmen", 1854; "Ueber Gesichtsneuralgia und Nervenresektionen".

Jos. Dittel and Fried. Wilhelm Lorinser should also be mentioned as famous surgeons of the Vienna school.

If the reputation of having introduced into German surgery the younger branch of pathological anatomy belongs to Schuh, the greatest credit is due to

CONRAD JOHANN MARTIN LANGENBECK (1776–1851), of Horneburg in Hanover,

as the founder of German surgical or topographical anatomy. Langenbeck was Surgeon-General of the Hanoverian army, Medical Counsellor, and from 1814 professor of anatomy and surgery in Gottingen, where he founded the anatomical theater (1830), and the surgical and ophthalmic clinic of this university. He was distinguished for his indefatigable industry, and was widely known as a brilliant operator, particularly as a rapid operator — he is said to have performed a disarticulation of the shoulder while a colleague who was present turned around to take a pinch of snuff. In the determination of the indications Langenbeck enjoyed less celebrity, a fact to which his frequent practice upon the battlefield may perhaps furnish the solution.

He favored the open treatment of wounds, avoiding all sutures. He cultivated ophthalmology, like all the earlier surgeons, as a part of surgery, and we owe to him the operation of iridokleisis, i. e. the healing of a part of the iris in the corneal wound, for the sake of forming an artificial pupil (1817). As a writer too Langenbeck was very active. His chief works were entitled: "Einfache und sichere Methode des Steinschnitts", 1802; "Handbuch der Anatomie", 1806; "Erfordernisse zur Bildung des Wundarztes", 1805; "Abhandlung über Leisten- und Schenkelbrüche"; "Nosologie und therapie der chirurgischen Krankheiten", 5 vols., 1822–1834; "Icones anatomicæ", 1836; "Langenbeck's Bibliothek für Chirurgie und Ophthalmologie" and "Neue Bibliothek" etc., etc. — His son Max (1818–1877) too, a physician in Hanover, published some works on surgery and ophthalmology, and in 1849 established the fact that the crystalline lens changes its form in the process of accommodation. Among Langenbeck's pupils Billroth mentions the recently deceased Swiss physicians Locher-Zwingli in Zürich and Mieg in Basel. — Langenbeck's brother, Rudolph Adolph Langenbeck, counsellor and director of the hospital in Riga, is the uncle of the Berlin surgeon.—G. F. Langenbeck, court-physician and Physicus in Bremervoerde, wrote on fractures of the neck of the femur.

Georg Friedrich Holscher (1792–1852) of Minden

was an important teacher of surgery and ophthalmology in the school of surgery in Hanover, an industrious writer and the editor of an influential journal (hannoverische Annalen). Having received a finished education in England — he was a pupil of Sir Astley Cooper — he translated in 1821 Brodie's work on the diseases of the joints, and subsequently published a number of journalistic articles.—In 1830 he was appointed surgeon-in-ordinary. — A colleague of Holscher's in the same institution was the eminent clinician, pathological and surgical anatomist, physiologist and physical diagnostician

G. Wedemeyer (1792–1829),

Staff-physician and Court-surgeon, and the author of a treatise entitled "Untersuchungen über den Kreislauf des Bluts und insbesondere über die Bewegung desselben in den Arterien und Capillargefässen", 1828.

Georg Spangenberg (1780–1849),

a teacher in the school of surgery in Hanover, Staff-surgeon, translated Guthrie's work on gun-shot wounds.—Among the universities of northern Germany the young university of Berlin attained almost at once a great reputation as a school for surgeons. This was chiefly due to

Joh. Nepomuk Rust (1775–1840) of the castle Johannisberg near Jauernick,

a surgeon descended from the old Austrian school, who was general physician to a division in the Prussian army during the Hundred Days, and after the close of the campaign a professor in Berlin.—Rust was particularly eminent as a clinical teacher, in which capacity he followed the Socratic method. As a skilful operator he was less famous. His literary reputation is found edchiefly upon his works on ulcers and diseases of the joints (Helkologie, 2 vols., 1811 and 1844; Arthrokakologie; Theoret. praktisches Handbuch der Chirurgie, mit Einschluss der syphilitischen und Augenkrankheiten; in alphabetischer Ordnung, 18 vols, 1830–36; Aufsätze und Abhandlungen aus dem Gebiete der Medicin, Chirurgie und Staatsarzneikunde etc., 3 vols, 1834–1840) and the "Magazin für die gesammte Heilkunde" (1816–1846), which he founded. Rust was the inventor of many instruments, a partisan of the actual cautery in inflammatory diseases of the joints, mercurial inunction in syphilis and moist dressings for wounds. He was likewise the reformer of medical affairs in

Prussia, and, among other improvements, introduced the division of Prussian surgeons into those of the first and second classes.

A still more capable teacher, and a surgeon of great eminence as an operator of independence, an ophthalmologist and an operative oculist — he used both hands with equal dexterity — was the ingenious

CARL FERDINAND VON GRAEFE (1787–1840) of Warsaw,

first a practising physician and then, at the age of 24 years, a professor in Berlin. During the war for independence he was appointed "Generalarzt", but after the close of the war he resumed his position as a teacher and became very influential in the development of German surgery, particularly operative surgery, and an extremely popular practitioner. His extraordinary zeal and eminent gifts as a teacher were brilliantly shown by the fact that he had his pupils operate themselves in his presence, as was subsequently done by Stromeyer. Von Graefe cultivated plastic surgery, particularly blepharoplasty, staphyloplasty, rhinoplasty etc., but also devoted attention to the diseases of the vessels (Angiectasie, ein Beitrag zur Cur und Erkenntniss der Gefässausdehnung, 1808) and ophthalmology (Behandlung der ägyptischen Augenentzündung), though in the latter branch he has been far surpassed by his distinguished son. He also invented numerous methods of operation (including dactylomyleusis, i. e. amputation with the chisel, which had been practised by Scultetus) and instruments. By his work entitled "Rhinoplastik, oder die Kunst den Verlust der Nase organisch zu ersetzen", 1814; "Normen für die Ablösung grosser Gliedmassen", 1812, he inaugurated the plastic surgery of our century.—Graefe died very suddenly of typhus (according to others he suffered a "tragic" fate) while on the road home from Hanover, whither he had been called to an operation upon the eyes of the then Crown Prince, subsequently King George V. The operation was necessitated by a sympathetic ophthalmia, was performed by Jaeger, and was unsuccessful in its results.

L. J. von Bierkowski, subsequently professor of surgery in Kasan, gave a description of the teachings and methods of the two famous Berlin surgeons (Anatomische-chirurgische Abbildungen, nebst Darstellung und Beschreibung der chirurgischen Operationen von Von Graefe, Kluge und Rust, 1827,)

A colleague of the two eminent surgeons just mentioned was

J. C. JÜNGKEN (1793–1875),

professor and medical Privy Counsellor in Berlin, who was especially famous as an oculist. He retired in 1868 after teaching for 50 years. His chief works were entitled: "Die Lehre von den Augenkrankheiten", often republished; Augenkrankheiten in der belgischen Armee"; "Die Anwendung des Chloroformes", etc., etc.

ERNST BLASIUS (1802–1875) of Berlin,

also recently deceased, studied under Jüngken and became a professor in Halle. He was a pupil of the Friedrich-Wilhelminstitut, graduated in 1823 and for the next four years served as an army-surgeon. In 1839 he was appointed professor in Halle in the place of Wutzer. In 1867 he resigned his position. — Blasius was a famous teacher and operator, in the latter capacity well-known for his elliptical method of amputation and his refracture of badly united bones by means of the osteoclast. His chief works were: "Handbuch der Akiurgie" (3 vols., Halle 1830-32) with "Akiurgischen Abbildungen" (1831-1833); "Lehrbuch der Akiurgie" etc. — The eminent surgical writer and historian

TRAUGOTT WILHELM GUSTAV BENEDICT (1785–1862) of Torgau,

professor in Breslau, also came from Berlin. His chief works were entitled "Lehrbuch der allgemeinen Chirurgie und Operationslehre", 1842; "Kritische Darstellung der Lehre von den Verbänden und Werkzeugen der Wundärzte", 1827; "Clinische

Beiträge aus dem Gebiete der Wundarzneikunst und Augenheilkunde", etc. Beside him, as an active surgical writer and also historian of surgery, we may place

JOH. GOTTLOB BERNSTEIN (1748–1835),

author of a "Practisches Handbuch für Wundärzte", 5th edition, 1820 etc. "Geschichte der Chirurgie vom Anfang etc", 1823.

C. W. WUTZER (1789–1858),

mentioned above, a famous teacher and professor successively in Münster, Halle and Bonn, was a pupil of the Friedrich-Wilhelminstitut in Berlin. His chief works were entitled "Allgemeine und specielle Chirurgie", 1844; "Operationslehre", 1846, both published from lectures. Wutzer was also the inventor of a method of invagination in hernia, which was much discussed in its day. Before him the quixotic

K. A. WEINHOLD (1762–1829),

who had served from the ranks up, was professor of surgery in Halle. His chief works were: "Die Kunst veraltete Hautgeschwüre zu heilen", 1811; "Ueber die abnormen Metamorphosen der Highmorshöhle", 1810; "Anleitung den verdunkelten Krystallkorper im Auge des Menschen jederzeit bestimmt mit seiner Kapsel umzulegen", 1809, etc. etc. By the way he proposed, in order to prevent pauperism, that all men should be rendered incapable of generation by the operation of infibulation, until they were manifestly able to support a family.

CARL HEINRICH DZONDI (1770–1835),

originally a painter, officiated still earlier as professor of clinical surgery in Halle. He afterwards established a surgical and ophthalmic private clinic, and is particularly well-known for his treatment of syphilis with corrosive sublimate, though, according to Proksch, this method had been practised long before in his part of the country.

In the school of surgery established by C. C. von Siebold in Würzburg his son

BARTHEL VON SIEBOLD (1774–1814),

became his father's successor in the chair of surgery, though he never attained his father's fame.

FRANZ CASP. HESSELBACH (1759–1816)

was Siebold's colleague in the chair of anatomy, though he also wrote on surgical subjects, particularly inguinal hernia. His son

ADAM CASPAR HESSELBACH,

professor of surgery and surgeon-in-chief to the general hospital in Bamberg, wrote an excellent monograph on the same subject entitled "Die Lehre von den Eingeweidebrüchen", 1829, second part 1830, a work still regarded as masterly. The Aulic Counsellor of Saxony — most aulic counsellors at the present day are found in Würtemberg and Baden —

BURKHARD WILH. SEILER (died 1844)

also rendered good service in the study of the subject of hernia. He translated Scarpa's work and made some additions to it. A bold operator and famous surgeon was

JOH. NEPOMUK SAUTER (1766–1840),

physician to the island of Reichenau and subsequently in Constance. (Extirpation of the entire uterus; Sauter's suspensory etc.)

Barthel Siebold's successor was

CAJETAN VON TEXTOR (1782–1860),

professor of surgery in Würzburg from 1816, and famous as the inaugurator of conservative surgery (resections) in Germany. He also translated the great work of Boyer and was the author of the memorable treatise "Ueber die Wiedererzeugung der Knochen nach Resektionen beim Menschen", 1842, which passed through numerous editions. Von Textor also wrote "Grundzüge zur Lehre der chirurgischen Operationen mit bewaffneter Hand". Trepanning he discarded, and was in general an advocate of expectant surgery. His son Carl von Textor (1815-1880), professor extraordinary in Würzburg, likewise rendered himself well-known as a surgeon. Among the pupils of Cajetan von Textor who devoted special attention to resections were:

MICHAEL JAEGER (1795–1838),

formerly professor in Erlangen, and

FRANZ RIED,

born in Kempten in 1810, and from 1847 to 1884 a professor in Jena. He is the author of a treatise entitled "Die Resektionen der Knochen", 1846; contains Jäger's portrait and two copperplates.

The deceased L. Schillbach in Leipzig, likewise a pupil of the "Old Textor", also advocated resections (Beiträge zu den Resektionen der Knochen, 1861, etc.). Hermann Demme Sr. (1803-1867), professor in Bern, also received his education in Würzburg. His gifted son Hermann Carl Demme (1831–1864) acquired a sad reputation by his thoughtlessness. (Militärchirurgische Studien, 2d. edition 1863; Pathologische Anatomie des Tetanus; Die Veränderung der Gewebe durch Brand.)

The successor of Textor in 1856 was

WENZEL VON LINHART (1821–1877) of Selowitz in Moravia,

widely known by his "Compendium der Operationslehre". He sprung from the Prague-Vienna school and was a pupil of Dumreicher. A dextrous operator and learned topographical anatomist, he published in 1866 his "Vorlesungen über Unterleibshernien", a subject which seems to have been a hobby in Würzburg since the days of Hesselbach.

A predecessor of Jaeger and professor in Erlangen from 1797 was the eminent surgeon

BERNHARD GOTTLOB SCHREGER (1766–1825),

who devoted his attention particularly to the subject of operations and dressings, as well as to orthopædic surgery. His chief works were: "Handbuch der chirurgischen Verbandlehre", 1823; "Grundriss der chirurgischen Operationen", 3d. edition 1825; "Chirurgische Versuche", 1811–1818, full of suggestive observations, in which even history is not neglected; "Nächtlicher Streckapparat" etc.

Less famous were the two following Bavarian surgeons:

M. KOCH, who proposed to do away with ligation of vessels, replacing it with manual pressure, and who also wrote, among other things, upon disarticulation of the lower jaw, 1831, and his follower

PHILIPP WILHELM (1798–1840) of Würzburg, professor in Munich and author of "Clinische Chirurgie", 1830; "Ueber den Bruch des Schlüsselbeins", 1822. Franz Christoph von Rothmund, who celebrated in 1883 the 60th anniversary of his reception of the Doctorate, acquired little reputation abroad, while Aug. Rothmund Jr. in Munich distinguished himself as an oculist.

Great reputation as a practitioner, and as the author of the text-book of surgery most frequently republished among all those of German origin, was enjoyed by old

MAX JOS. VON CHELIUS (1794–1876) of Mannheim,

a surgeon schooled in the wars for independence, and educated in Landshut (under Walther), Vienna and various other German and French universities. Chelius was at first a hospital physician in Ingolstadt, but was subsequently ennobled, and from 1817 enjoyed the positions of professor and Privy-Counsellor in Heidelberg, to whose university he for a long period attracted numerous pupils. According to the historian Georg Weber, the University of Heidelberg owes its international character to Chelius. His teachers were Kern, Beer and Zang. It was Chelius who introduced at Heidelberg the surgical and ophthalmological clinic. According to Weber, Chelius was "a man of reactionary disposition (in whose opinion Sand was regarded as physically strong enough to be beheaded) with aristocratic manners, though on his mother's side of very humble origin, a crafty practitioner, who required his fees to be always paid in gold, though ever ready to assist the poor, and the only professor in Heidelberg who in his day kept a carriage." His chief works were "Handbuch der Chirurgie", 1822, 8th edition 1857, a book translated into six different languages, though discarded by Stromeyer because it did not contain a single idea original with Chelius; "Ueber die Blasenscheidenfistel", 1844; "Zur Lehre von den schwammigen Auswüchsen der harten Hirnhaut", 1831; "Ueber die Anwendung kalter und warmer Umschläge bei Kopfverletzungen"; "Handbuch der Augenheilkunde", 1839–1844. — His son Franz von Chelius, professor and private surgeon in Heidelberg, has not as yet attained as an author and practitioner the reputation of his father.

PHIL. FRANZ VON WALTHER (1782–1849) of the village of Burrweiler in the Bavarian Palatinate, son of an official of that village, exercised as a teacher, surgical writer, operator and oculist for a long time the greatest influence upon the development of German surgery. He was a professor successively in Landshut (1804), Bonn (1819) and Munich (1830), founder of the surgical clinics in the two former universities, Bavarian Privy-Counsellor and Surgeon-in-ordinary etc. The house in which he was born has been supplied with a tablet to his memory.

Walther's pupils (among whom were Chelius and the eminent Bavarian surgeons already mentioned, with numerous physicians) were scattered throughout all Germany, and particularly South Germany. He defended above all the indivisibility of surgery and medicine ("A complete surgery embraces in itself medicine also, just as a perfect medicine comprehends surgery"), as did Kern, and as the result probably of this feeling he was a Systematist in surgery, embracing the views of the school of natural philosophy, after having already cultivated even animal magnetism. As an operator he was extremely conscientious, possessed of great presence of mind, and a model of carefulness in the after-treatment, even applying his own dressings. As regards the latter, a true associate of Richter and Kern, he strove to remove from surgical dressings everything artificial and professional. Walther was a diligent, extremely fertile and ingenious writer. Besides numerous independent works, he edited the famous "Journal für Chirurgie" in union with Gräfe, and subsequently with Ammon in Dresden. His chief works were his "System der Chirurgie", 1843, 6 vols.; "Lehrbuch der Augenkrankheiten", 2 vols., 1849; "Abhandlungen aus dem Gebiete der praktischen Medicin, besonders der Chirurgie und Augenheilkunde", 1819; "Neue Heilart des Kropfes, nebst Geschichte eines durch die Operation geheilten Aneurysma's der Carotis", 1817; "De ligatura carotidis communis", 1831; "Die Chirurgie in ihrer Trennung von der Medicin", 1806; "Merkwürdige Heilung eines Eiterauges", 1819 etc., etc.

A famous surgeon, surgical writer and operator was Friedrich Pauli (died 1868) of Landau, a pupil of Walther and, as Stromeyer says, the first surgeon to perform the operation for strabismus. A popular surgical practitioner too was "old" Julius Bettinger (1802–1887), physician and surgeon to the Palatinate hospital in Frankenthal.

J. L. G. **Fricke** (1790-1842) of Brunswick, physician to the hospital in Hamburg and Director of the Medico-chirurgical Institute in that city, acquired considerable reputation as a surgeon and operator.

His name is known to every physician by Fricke's forceps. Fricke wrote "Geschichte einer durch den Lebensmagnetismus geheilten Epilepsie", 1812; "In memoriam defuncti Immanuel Baggesen", 1826; "Annalen der chirurgischen Abtheilung des allg. Krankenhauses in Hamburg"; "Episiorraphie"; "Die Bildung neuer Augenlieder", 1829 etc. — In conjunction with Friedr. Wilh. Oppenheim (born 1799), who had been for a long time an army-surgeon in Russia and Turkey, he edited a "Zeitschrift für Medicin".

The following surgeons also deserve notice as lithotomists: Christian von Klein (1740–1815) in Stuttgart; the Würtemberg country-surgeon Michael Zett (1778–1864), who, according to Renz, performed 107 lithotomies with only three deaths.

Johann Friedrich Dieffenbach (1794–1847) of Königsberg, professor in Berlin, was a born surgeon and particularly ingenious operator, full of enthusiasm and indefatigable in the pursuit of that profession for which he felt an internal calling. Fertile in the invention of new measures and methods for the attainment of the objects before him, often devising them in the very performance of the operation, he was brilliant in the establishment of the indications, quick in forming his opinions, courageous in carrying them into execution and in the highest degree dexterous in the manipulation of instrumental aids, preferring the simplest to the more complicated and not despising the most trifling, if it seemed to be adapted to the object in view. In spite of a hot-blooded temperament and profound sympathies, he was safe and calm in operative measures, as well as careful and circumspect in the after-treatment. As a writer Dieffenbach was possessed of a plastic force, an internal truthfulness, a clear and classic language, though his words were extremely simple, unless the inspiration of the moment or warm enthusiasm for the subject constrained him to the employment of lofty expressions of his thoughts and feelings. He wrote, as he labored, from experience and for practical life, not from and for the closet of the learned. Dieffenbach won during his life a reputation almost undisputed at home and abroad, and he enjoyed a fame almost as unquestioned after a death which carried him off suddenly, in the midst of complete activity, with reputation and brilliancy undimmed, so that the fortune which showed herself almost unswervingly true to him in life, so far as the nature of the case admitted, abandoned him not even in death. A rare man and a still rarer fate! He often said "I dread to die — that is a painful struggle; but death is beautiful!"

That Dieffenbach, in addition to ingenious natural gifts and profound knowledge in his favorite department, was also complete master of, and employed practically, all the sciences accessory to surgery — particularly the chief of these, the anatomy and physiology of his time — need only be mentioned.

Dieffenbach sprung from a family of upper Hesse, which could point to many men of talent, poets, writers on belles-lettres, spirited travellers, so that many sides of the surgeon and author Dieffenbach must be regarded as inherited. The latter was the son of the prematurely deceased Conrad Dieffenbach, teacher in the city school in Königsberg. Dieffenbach was designed for the ministry, and accordingly, after receiving his preparatory education from the year 1809 in the gymnasium at Rostock, he attended the university of Greifswald. During the war for independence he fought among the Mecklenburg mounted riflemen. After the close of the war, however, he resumed the study of theology in the university mentioned above, but subsequently diverted his attention to medicine. He then went to Bonn (where, according to H. Heine, he prepared himself for his future career as an operator by cutting off the tails of all the dogs) under the teaching of Walther, and in 1821 he went as a travelling physician with a blind lady to France, where Dupuytren and Larrey gave him special advantages. In 1822 he wished to go by way of Marseilles to Greece, but was unable to accomplish his desire, and returning to Germany he took his degree of doctor in Würzburg. His dissertation had for its subject the "Transplantation thierischer Stoffe". Removing now to Berlin, he speedily won practice and reputation as an operator, so that in 1830 he was appointed surgeon to the Charité and a member of the Board of Examiners. In 1832 he was nominated professor extraordinary, travelled again in 1836 to France, and in 1840 became Grafe's successor and president of the surgical and ophthalmological clinic. In 1841 he visited Vienna, and in 1843 St. Petersburg. As a teacher and operator of the first rank he educated numerous students and attracted many physicians to the university of Berlin. He was also a member of the order pour le mérite. — Dieffenbach's chief merits are that he perfected plastic operations in their widest sense, that he extended tenotomy over a wider field and particularly to the muscles of the eye, and in general that he simplified and reconstructed the theory and technique of operative surgery. Like Würtz, Desault and almost all great surgeons, he was an opponent of trepanning. — By some he was charged with an excessive fondness for operations, a feeling to which his marvellous dexterity may perhaps have contributed. His works were entitled: "Transfusion des Blutes und Infusion der Arzneien", 1828; "Chirurgische Erfahrungen, besonders über die Wiederherstellung zerstörter Theile des menschlichen Korpers nach neuen Methoden", 1829–34; "Anleitung zum chirurgischen Verbande", by Henkel and Dieffenbach, 1829; "Anleitung zur Krankenwartung", 1832; a translation of Roux's work on "Staphylorraphie" and Serre's "Eyes of Insects", 1828; "Physiologisch-chirurgische Erfahrungen bei Cholerakranken", 1832; essays on transfusion, infusion, experiments on transplantation in animals — he learned to operate upon animals himself — transplantation of completely separated portions of skin (according to Rohlfs he was the first to transplant pieces of the cornea in man), injuries of the rectum, cleft-palate, staphylorraphy, imperforate anus, urethral strictures, the velum palatinum in men and the mammalia, injuries of the head, the twisted suture, cutting off ligatures, disarticulation of the femur, extirpation of ovarian tumors, new methods for the restoration of eyelids and lips, for the reconstruction of the depressed nose from the stump of the old organ, the treatment of fissure of the palate, the treatment of ectropium, precocious development of a child which menstruated at the age of 19 months, treatment of vesico-vaginal fistula, laceration of the thumb, division of the sterno-cleido-mastoideus and other muscles, operations for the cure of stammering, on strabismus and its cure by a surgical operation etc. His chief work, however, was "Die operative Chirurgie", 2 vols., completed by J. J. Bühring; and his last work, "Der Aether gegen den Schmerz", 1847 (Compare Isensee). — To establish, so far as space permits, the statements already made, we quote the following passages:

"The division of the inferior rectus by itself for downward squint I have undertaken once only in more than 3000 operations for strabismus, for only a single case of this kind has presented itself to me — a Prussian officer who had a downward squint in one eye. In nystagmus bulbi, however, I have often performed this division in conjunction with that of the other muscles of the eye.

The inferior rectus muscle is somewhat thicker than its opponent, the rectus superior. It originates, in common with the external and internal recti, from a flat, tendinous band on the lateral surface of the body of the sphenoid, which projects through the superior orbital fissure into the orbit and divides into three points. The muscle passes forward through the orbit and is attached to the under and anterior part of the bulb upon the sclerotic. This point is distant three lines from the edge of the cornea.

The preparations for this operation are the same as for division of the other muscles of the eye. After the lids have been strongly separated by the speculum, the patient leans his head back upon the breast of an assistant and fixes his gaze upon the ground. The fold of the conjunctiva is then raised by the tenaculum, on the lower side of the external border of the cornea in the transparent part, and divided. The transverse wound should be at least one-third of an inch long. The eye is now more strongly depressed, the scissors are pressed in more deeply and the cellular tissue covering the muscle is cut through. If the muscle is sufficiently denuded a passage is made with the scissors beneath its fibres, a blunt hook introduced, the cellular tissue behind the muscle loosened by pressing backwards with the closed scissors, the eyeball still further depressed and the muscle then divided as far back as possible, or, if it is desired to perform tenotomy, the tendon is divided in front of the hook."

"It is with no feeling of cheerfulness that the surgeon acts, when a feeble ray only of hope for the preservation of his patient constrains him to the performance of a deep and bloody operation, by which, even at best, he may merely save the life of a miserable cripple. Such has always been my experience when forced to perform this operation (disarticulation of the os femoris). . . . . From the outset we can imagine from the results of amputation of the femur how profound must be the influence upon the entire circulation and upon the nutrition of the body of an operation which takes away from the body one fifth of its entire mass. We should likewise recognize our great indebtedness to Larrey, who in the beginning of the present century rescued from oblivion this operation, not yet an hundred years old and rarely practised. Although too under unfavorable circumstances he attained no brilliant results, yet it is sufficient to start with, that of seven men devoted to death he was able to save two, a mortality which in all probality will greatly decrease under the influence of more opportune performance under favorable circumstances" — a view which unfortunately has not been confirmed by experience.

In regard to his operative surgery, which is regarded as a classical masterpiece. Dieffenbach said: "I wish that mine too were such a book (as Richter's). It has been to me no unpleasant task, but an agreeable occupation, and this stamp I wish to have impressed upon it. . . . These are no melancholy reflections in the evening of my life, but occurrences not only of the day before yesterday, but of yesterday and even of to-day, viewed with the glow of youth and in the actual present. . . . It has been my effort to influence the ideas of my young readers, to show them pictures of life whose outlines are sketched in blood" — he had his own heart's blood, with which genius ever paints, upon his palette — "and thus to avoid wearying their recollection with unprofitable matters, by which the intellect is injured."

"Of all the branches of medical science operative surgery is most adapted to carry away you young men with enthusiasm. The man of feeling shudders at the thought of plunging the knife into the flesh of a fellow-man, of doing this in cold blood, of moving the knife here and there, of cutting still deeper, of being sprinkled with a shower of blood, in the midst of the cries of anguish of the poor mutilated patient, and yet of thinking and feeling! Operative surgery is a bloody struggle for life with disease, a struggle for life and death. Audacity and insensibility cannot here win the victory, but calmness and enthusiasm, knowledge and dexterity. Without a certain natural disposition for this branch, without being thoroughly permeated by it, and without a fiery devotion to it, he who dedicates his life to operative surgery will always continue a beginner. He may have studied thoroughly all branches of medical science, he may be acquainted with all the surgical operations and the various methods for their performance as taught by different masters, he may be able to perform them upon the cadaver and upon the living patient, and yet he will remain merely a subordinate in his surgical practice. This, however, makes the true surgeon — to be able, and to know how, to execute that which is not written in the books, to invent new methods — not a new bandage or a new knife — to be always an inventive Odysseus, and under the most difficult circumstances to be capable of winning the battle at once without any council of war. The painter learns to draw carefully, to mix and lay on the colors, to copy correctly — and then paints independently, paints his own ideas, his fancies. Anyone can learn to make verses, but to write poetry cannot be learned, it is a faculty innate in the poet. One may also learn to use the knife, but often he is compelled to cut differently from what he has learned in the books. That is operative surgery. . . . . The best surgeons are recognized only by the clearness of their thought and the simplicity of their expressions. . . . . The best surgeons have always been the best writers, they may be recognized by their style, and the writings of old Pott, of our August Gottlieb Richter and of Astley Cooper might be read in our schools as models of style." — Dieffenbach from his imaginative style might be called the Romancist of Surgery.

From among Dieffenbach's pupils

A. Th. Middeldorpff (1824–1860),

professor in Breslau, has secured permanent fame by his introduction of the galvano-cautery into German operative technics. Among his more important works are: "Die Galvanokaustik", 1854; "Beiträge zur Lehre von den Knochenbrüchen", 1853; "De polypis œsophagi atque de tumore ejus generis primo prospere extirpato commentatio", 1867, and "Commentatio de fistulis ventriculi externis et chirurgica earum sanatione" etc., 1858. — In the employment of galvanism Middeldorpff was anticipated by Fabré-Palaprat (1828) in electrolysis, and particularly in the use of the galvano-cautery by Gustav Crusell of St. Petersburg (1847). The subject was also studied still earlier by even Récamier and Pravaz (1841), Steinheil in Munich and Heider in Vienna (1844), John Marshall (1850), Thomas Harting and George Waite in London (cauterization of the teeth). Middeldorpff was, however, unacquainted with the labors of his predecessors in this department.

A. Burow (died 1875),

the recently deceased professor in Königsberg, is known in surgery, in addition to many other matters, by his revival of the open treatment of wounds, a method also advocated by H. Vezin and Bartscher. Another pupil of Dieffenbach's,

H. J. Paul (died 1877) in Breslau,

is specially known from his study of operative statistics to promote rational surgery.

A predecessor of the great surgeon to be next mentioned in the professorial chair at Kiel was the famous and recently deceased

Gustav Biedermann Günther (born in Schandau near Dresden in 1801, died 1871),

finally professor in Leipsic, who obtained much credit for his operative teachings and his surgical anatomy. Among his best known works are: "Leitfaden zu den Operationen am menschlichen Körper", 3 parts, 1859–1865; "Lehre von den blutigen Operationen am menschlichen Körper", 1853–1863, etc.

If it was a pleasure to meet in Dieffenbach a master as well of German literary style as of German surgical art, the same is the case (though in a modified way and with altered shading) with respect to another surgeon of Germany, possessed of great native and professional gifts and endowed with eminent surgical talents as well, we mean

George Friedrich Louis Stromeyer (1804–1876) of Hanover, successively professor of surgery in Erlangen (1838), Munich (1841), Freiburg (1842), Kiel (1848), and from 1854 physician of the general staff in Hanover. In 1866 he was retired and died, like Dieffenbach and the great John Hunter, suddenly and painlessly in the midst of his professional activity, just as he was starting to attend to his practice, and in the midst of the work, which in his precious "Erinnerungen aus dem Leben eines deutschen Arztes" he, with the Psalmist, has extolled as the most beautiful and excellent in life.

Like Dieffenbach, Stromeyer was a master of language — like many surgeons he was also poetically gifted — only his descriptions lack something of that pithy, hearty force, the stamp of an ever active, iron and vigorous will, which shows itself in Dieffenbach. In its place we find sensibility and a certain *bonhomie*, a yielding, indeed sometimes a softness and tendency to reflection, combined with a touch of resignation and self-limitation. From these we acquire the impression that he might hold the knife, as he does the pen, with a hand more easily disposed to tremble than that of Dieffenbach, and thus under certain circumstances the safety and dexterity of his operative measures might be impaired. On the other hand, Stromeyer displays eminent medical skill, particularly as a hospital hygienist. He is as good a medical therapeutist and physiologist as a surgeon, qualities which may be due to the fact that his education was finished under the direction of English surgeons. The feeling of the narrow limits of professional capability is more active in Stromeyer than in Dieffenbach. The latter, like an "inventive Odysseus", always holds before us the prospect of new ways and means of aid, while Stromeyer accepts those limits with resignation. "The art of healing is, indeed, adapted to clear up errors, for we cannot deceive ourselves over its results. For him who advances with circumspection the danger of rocking himself to sleep in delusions for a long time is not great, for his errors become pernicious to others. We rejoice in whatever we find actually beneficial. He who is fortunate in this respect will not tire in searching for new truths, and will not be eager to drop what has proved itself of value" (see "Erinnerungen"). Finally Stromeyer is pre-eminently a military surgeon, while Dieffenbach is a surgeon of the civil hospital and of daily practice.

Stromeyer was the most ingenious field-surgeon of Germany. Indeed, if he did not properly call military surgery into life in Germany, he at least emancipated it from foreign influences. His work "Maximen der Kriegsheilkunst" (1855) in this way forms a turning-point in the history of this branch of German surgery. The surgeons of the preceding century and of the wars of liberation followed mainly the military surgery of the French. The want of a deep national consciousness, which might have created a national military surgery, was felt necessarily by the Germans, afflicted as they were with numerous native lands and corresponding feelings of nationality. That national feeling, as we know, was first developed by means of the Revolution of 1848 and the Schleswig-Holstein wars, and it was these two that, with historical necessity, called into existence a national military surgery and awakened in Stromeyer its most ingenious literary representative.

Sharers in the new foundation of this branch of surgery were Bernhard von Langenbeck (1810–1887, originally professor of surgery in Kiel, and from 1847 Dieffenbach's successor in the University of Berlin[1]), and the native of Schleswig, Friedrich Esmarch (born 1823), since 1857 professor of surgery in Kiel, both of whom were, like Stromeyer, active in all the wars since 1848. It was these three surgeons who introduced the so-called conservative surgery, especially resections, into the practice of war, and thereby marked out a new era in military surgery. Their names will therefore continue ever doubly united in history with the warlike achievements of our people, as those of true patriots and founders of a German national military surgery, won in wars carried on for national aims.

Stromeyer's second (chronologically, however, the first[2]) reform, was the creation of operative orthopædia, that is the application of subcutaneous tenotomy (heretofore practised in special cases only by Delpech e. g.) to the whole class of deformities of the skeleton depending upon muscular defects, particularly those of the lower extremities.

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[1] After the attempted assassination of the emperor William by Nobiling, and as the result of his successful treatment of the wounds of his imperial patient, Langenbeck was made "Generalmajor à la suite" and "activer Officier", the first example of this rank in a physician since the days of the Byzantine empire. — A work of Langenbeck's entitled "Vorlesungen über Akiurgie", and taken from manuscripts left by the deceased surgeon, was published posthumously in 1888 by Prof. Dr. Th. Gluck.

[2] His first description of the operation appeared in Rust's "Magazin für die ges. Heilkunde" in 1833, and the "Beiträge zur operativen Orthopädik" etc. in 1838. Subcutaneous tenotomy was introduced into the United States about 1840 by Dr. Wm. Detmold (born in Hanover in 1808, removed to the United States in 1837), Emeritus Prof. of Clinical and Military Surgery in the College of Physicians and Surgeons, New York. Few of Prof. Detmold's old students will ever forget the grim humor with which he used to describe his first experience in the introduction of the operation into this country. (H.)

This apparently insignificant operation has since produced more brilliant results than the method of rapid and frequent operation, still in vogue at the time of the invention of tenotomy, and the practice of ligation of the great vessels carried on a short time before. Stromeyer also recommended the operation of tenotomy for strabismus in 1838, but it was first performed, on his recommendation, by Dieffenbach in 1839.

Besides the surgeons already mentioned, Bernhard Beck, "Generalarzt" in Baden and the son of the oculist and aurist Karl Jos. Beck (1794–1838), well-known by his "Handbuch der Augenheilkunde (1825) und der Krankheiten des Gehörs" (1827), acquired an eminent reputation by his experimental studies on gun-shot injuries, and as an author on military surgery and medicine. He was a pupil of Stromeyer.

Besides the above-mentioned "Maximen", Stromeyer wrote a memoir in the Archives générales de médecine (1833), by which his operation of tenotomy became speedily known. In 1838 followed his "Beiträge zur operativen Orthopädik", after which appeared his "Handbuch der Chirurgie" (1844), translated into Dutch by Donders, "Erfahrungen über Schusswunden im Jahre 1866" (1867) and "Erinnerungen eines Arztes" (1875). In this last work the peculiarities of Stromeyer as an author are specially prominent. — Esmarch's first book "Ueber Resektionen nach Schusswunden", 1851, excited immediate attention. It was followed by "Beschreibung einer Resektionsschiene" (1859), "Beschreibung eines künstlichen Beines" (1866), "Ueber chronische Gelenkentzündungen" (2d edition 1867, immobility of the joint), "Verbandplatz und Feldlazareth" (1871), "Anwendung der Kalte in der Chirurgie", "Der erste Verband auf dem Schlachtfelde" (1869), "Ueber künstliche Blutleere bei Operationen" (1873).—The history of Esmarch's bloodless method of operating teaches once again that all important discoveries are preceded by individual facts and practices of a similar kind, which, however, fail to receive their full value until the flash of genius touches them and raises them to a legitimate whole. Compressing bandages were used as early as the time of Chrysippus, and were employed even in amputations by both ancient and modern surgeons. Indeed ligation of the limb *en masse* was practised by individual surgeons. Thus the former method was practised by Clover (1852), and the latter method alone by Chassaignac (1856), A. Richard (1867), Silvestri in Vicenza (1871), and both methods together by F. Guyon (1870). Yet Esmarch was the first surgeon to elevate the two methods together into a practical and useful system. — Recently (1882) Esmarch has established a "Samariterverein", on the model of similar English societies. ("Leitfaden für Samariterschulen"; "Die erste Hilfe bei plötzlichen Unglücksfällen", 1882). His "Handbuch der kriegschirurgischen Technik" may be called his most important book.[1]

Christoph Jacob Friedrich Ludwig Gustav Simon (1824–1876) of Darmstadt, professor in Rostock and finally in Heidelberg, also made his début as an author on military surgery, but subsequently turned his attention to the surgery of the vagina, the kidneys (he performed the first extirpation of the kidney among modern surgeons), the bladder (vesico-vaginal fistula), and the rectum (forcible manual exploration of the anus and forcible dilatation of the female urethra for the inspection of the bladder). The methods of operation and investigation in these branches of surgery he improved substantially, though occasionally rather forcibly. Simon was distinguished as a skilful and bold operator. He was a pupil of Adolph Werner, like

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[1] Prof. Esmarch will be recollected in this country for his gratuitous and hostile criticism of the treatment of the wound of President Garfield by his attending surgeons. (H.)

HEINRICH ADOLPH BARDELEBEN (born 1819),

Prof. of surgery in Greifswald and in 1868 the successor of Jüngken in Berlin. Bardeleben studied medicine first in Berlin, then in Giessen and subsequently also in Paris, and became prosector and extraordinary professor in Giessen. By his edition of Vidal's text-book, and from the fact that in 1888 he took the place of Bergmann in the case of the emperor Frederick[1] in consequence of a characteristic, but lamentable "doctors' quarrel", he has become widely known in both professional and lay circles.

ADOLPH WERNHER (born in Mayence, March 20th, 1809, died in the same city, July 14th, 1883)

was professor of surgery in Giessen and director of the university hospital in that place from the year 1846. — The son of a Hessian state-counsellor who came from Zweibrücken, Wernher studied in Giessen, Heidelberg, Berlin, London and Paris, and as early as 1834 was appointed an extraordinary professor. In 1835 he was promoted to ordinary professor and in 1878 he was retired.

Wernher, who was an eminent teacher and diagnostician and a better surgeon than operator—he had the misfortune to lose the sight of one eye through a gonorrhœal ophthalmia contracted from a patient — rendered good service to surgery in the subjects of diseases of the joints, particularly of the hip-joint; tumors, a subject which he was one of the first surgeons in Germany to take in hand; hernia and trusses; the resection of bones and nerves, etc. He is also the author of one of the best handbooks of surgery (2d. ed., 1862), distinguished for its careful attention to the literature of the subject, particularly the French and English, for its thoroughness and for its constant regard to the demands of practical use. His works are: Handbuch der allgemeinen und speziellen Chirurgie, 1846–1857, 2d. ed., I vol., 1862; Die angeborenen Kystenhygrome und die ihnen verwandten Geschwülste in anatomischer, diagnosticher und therapeutischer Beziehung. Denkschrift zur Feier des 50jährigen Doctor-Jubilaums des Dr. Wilhelm Nebel. Professor primarius etc., 1843; Beobachtungen über schmerzhafte Atrophien der Mamma, Cirrhosis mammæ und atrophirende Sarcome derselben; Berichte aus dem Hospitale zu Giessen, 1848; Treatises on hernia and trusses in Langenbeck's "Archiv"; others on osteochondritis epiphysaria, elephantiasis Arabum, central extirpation of telangiectatic tumors, chirurgico-historical works etc. — In the neighboring university of Marburg

WILHELM ROSER,

Prof. of surgery, first known to fame as the co-editor of the well-known journal, is an eminent surgical anatomist and physiologist, as well as a skilful operator and popular practitioner. Among his works are: "Allgemeine Chirurgie", 1845; "Handbuch der anatomischen Chirurgie", 4th ed. 1864; "Chirurgisch-anatomisches Vademecum", 6 editions up to 1880; "Lehre vom Hornhautstaphylome", 1852; "Therapeutisches über Pyämie". — Roser rendered good service in the study of strangulated hernia, a subject in which A. F. Danzel also distinguished himself.— The important anatomist (central nervous system),

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[1] The German physicians knew and stated the truth as to the cancerous nature of the emperor's trouble years before.

B. STILLING (1810–1874) in Kassel,

also distinguished himself as an operator (lithotrity, ovariotomy etc.). Among the pupils of Roser are:

C. HUETER (1837–1880) of Marburg, professor in Greifswald, and W. König in Göttingen, the successor of W. Baum (1799–1883) who in 1875 resigned his professorial chair in this university, a position which he had recently taken and filled with great acceptability. Joh. Heinrich von Dumreicher, (1815–1880) of Trieste, baron von Oesterreicher, a pupil of Wattmann and, according to his own account, a man of little erudition, but a humane practitioner of surgery and accordingly very busy and greatly esteemed, was a professor in Vienna from 1849, while the famous operator Johann von Balassa, also a scion of the Vienna school, died at Pesth in the year 1869, and his successor C. A. Kovács (born 1815) in 1878. Dittel (born 1815) in Vienna. Blazina (1812–1885), professor of surgery in Prague. — Among Dumreicher's pupils are: Ed. Albert in Vienna, A. Mosetig, Joh Hofmokl, C. Nicoladoni in Innsbruck, V. van Ivanchich and others. — Karl Wilhelm, Ritter von Heine (1838–1877), Prof. in Prague, died, like his teacher, of diphtheria. He was the son of the orthopædic surgeon Jac. von Heine (1799–1878) in Canstatt, scion of a surgical family (we have already mentioned one of its members, Bernhard von Heine) which originated with Georg von Heine (1770–1838), an ex-farrier and inventor of an extension bed, subsequently an honorary doctor of surgery etc.

Among the representatives of modern surgery, besides Hüter and König are: Theodor Billroth (born 1819 in Bergen on the island of Rügen), Prof. in Vienna and successor of Schuh (first extirpation of the larynx, 1873; resection of the stomach, an operation which Carl Theodor Merrem in 1810 had proved by experiment to be possible; Allg. chir. Path. und Therapie, 9th edition, 1880), whose "realistic" ideas permitted him, in his well-known book "Ueber Lehren und Lernen etc.", to make use of the following language: "I did not feel strong enough to undertake the martyrdom of a pure catheter-professor, which would have afforded me no opportunity for the development by practice of a comfortable life, corresponding to my tastes". Weinlechner, W. von Winiwarter, Gussenbauer in Prague etc., Rich. von Volkmann in Halle (son of the anatomist and physiologist Alf. Wilhelm Volkmann — 1801–1877 — in Halle, eminent also under the pseudonym of "Richard Leander" as a composer of lyric poems, poetic stories etc.); W. Busch (1820–1880) in Bonn, who operated upon the empress for a strangulated hernia; F. Busch in Berlin; Trendelenburg in Rostock, now in Bonn; W. Heineke in Erlangen; A Lücke in Strassburg; C. Emmert in Bern; Edm. Rose, some time ago in Zürich (Operationen am hängenden Kopf); Socin in Basel; Schönborn, formerly in Königsberg (in place of A. Wagner who died in 1871), now in Würzburg; Thiersch in Leipzig, whose predecessor was Friedr. Franke (died 1859); Nussbaum (born 1829; nerve-stretching, 1860; combination of injections of morphine with chloroform; 300 ovariotomies, 1880) in Munich; V. von Bruns (1812–1883), born in Helmstädt, studied in Braunschweig, Tübingen, Halle and Berlin, began practice in Braunschweig in 1837, became teacher of anatomy in the Collegium chirurgicum there in 1839, professor in Tübingen from 1843 to 1882, one of the most renowned surgeons of our day (Lehrbuch der allg. Anatomie, 1841; Kehlkopfchirurgie, 1865; Handbuch der pract. Chirurgie, 1854–1860; Galvanochirurgie, 1870; Galvanocaustik, 1877; Chirurg. Heilmittellehre, 1868–1873; Arzneioperationen, 1859, etc.), whose son Paul Bruns is also in Tübingen; C. F. Lohmeyer in Göttingen; Fischer in Breslau; M. Schede in Halle; Heinrich Leisrink (died 1885), physician to the hospital in Hamburg, who with Peter Ludwig Panum (1820–1885) in Copenhagen, Oskar Hasse in Nordhausen, Gesellius in St. Petersburg and others, defended the transfusion of blood; A. W. Schultze in Berlin; F. W. Ravoth (1817–1878, hernia); Wilms (1824–1880), a famous surgical practitioner in Berlin, who with Langenbeck and the ordinary physician Lauer also treated the emperor after the attempted assassination of June 2d, 1878; E. Gurlt (wrote also on the history of surgery); E. von Bergmann in Berlin and earlier in Würzburg; H. Bose in Giessen, a pupil of Wernher; Krönlein, professor in Zürich; Madelung in Rostock; Paul Vogt (1844–1885) in Greifswald; F. E. W. Steudner (1838–1880) in Halle; Vinc. Czerny in Heidelberg, a pupil of Billroth and particularly an operative surgeon; H. Maas in Würzburg (died 1886); Paul Kraske in Freiburg, a pupil of Rich. Volkmann, and numerous others.

We should also mention Dr. Gustav von Lauer (1808–1889) of Wetzlar, from 1844 ordinary physician of the emperor Wilhelm I., from 1854 a professor and subsequently Chief of the Department of Military Hygiene and of the institutions for the education of army-physicians. It is to him especially that army-physicians are indebted for the fact that since 1873 they have enjoyed the rank of commissioned officers.

From the large number of eminent German ophthalmologists of our century we have already mentioned, besides those of Vienna, Joseph von Hasner (Ritter von Artha, born 1815) and Albrecht von Graefe,[1] the latter of whom through the single method of operation for glaucoma (iridectomy, 1856) would have secured his fame forever, were it not equally secure through the introduction into ophthalmology of the ophththalmoscope, an instrument which opened a new epoch in that science. Without making pretensions to completeness, we should add further the names of: Runge and Franz Reisinger (1788–1855) in Landshut and Augsburg, who introduced atropin and hyoscyamin as mydriatics and practised the transplantation of pieces of the cornea in animals etc.; Joh. Christian Jüngken (1793–1875) in Berlin; Karl Heinrich Weller (born 1794) in Dresden; Ludwig Böhm (1811–1869) in Berlin; Christ. Georg Th. Rüte (1810–1867) in Leipzig; Fr. Aug. von Ammon (1799–1861) in Dresden, an eminent oculist, physician and writer, specially meritorious for his labors on the pathological anatomy of the eye (Klinische Darstellungen der Krankheiten und Bildungsfehler des menschlichen Auges etc., Berlin 1838–41, with an atlas), and acquainted also with sympathetic ophthalmia; his pupils and colleagues, Joh. Heinr. Beger (1810–1885) in Dresden; Gust. Heinrich Warnatz of Camenz; Friedrich Karl Stricker (born 1816) in Frankfort-on-the-Main (Die Krankheiten des Linsensystems nach physiol. Grundsätzen, 1845; Der Ritter Taylor: Reisehandbuch für Aerzte, 2d edition 1845, with numerous historical works); Karl Hecker (1812–1878), Prof. in Freiburg and a brother of Friedrich Hecker; Fried. Phil. Ritterich (1782–1866) in Leipzig, the incumbent of the first (1828) special professorship of ophthalmology in Germany; August Burow (1809–1874) in Konigsberg; Ernst Ad. Coccius (born 1825), Rüte's successor as professor of ophthalmology in Leipzig; W. Zehender in Rostock; Alfred Karl Grafe (born 1830) in Halle; H. Knapp, formerly in Heidelberg, now in New York; Robert. Ritter von Welz (1814–1878) of Kelheim, Prof. in Würzburg Th. Leber in Göttingen; of the medical family of Pagenstecher: Karl Pagenstecher (died 1865), Alex. Pagenstecher (1839–1880), a good operator, killed by a ball from his own hunting-rifle; Hermann Pagenstecher (Pathol. Anatomie des Auges; extraction with the capsule, recommended even by Beer) in Wiesbaden; Rothmund senior and junior in Munich; O. Becker in Heidelberg, (Pathol.-anat. Atlas des Auges; Krankheiten der Linse; an edition of Donders' work on refraction), to whom the author takes pleasure in here offering a tribute of gratitude; the deceased Küchler, who even extirpated the spleen, though unsuccessfully (Péan obtained the first success in 1877); Jacobson in Konigsberg (Iridectomie vor der Extraction als Methode etc.); Weber in Darmstadt, an eminent operator and investigator; Hermann Schmidt-Rimpler in Marburg; Mooren in Dusseldorf (Iridectomie längere Zeit vor der Extraction; Augenkrankheiten in Beziehung zu andern Körperleiden etc.); Theod. Saemisch in Bonn; Zander; F. Horner in Zürich; C. Schweigger in Berlin; A. Nagel in Tübingen; H. Cohn in Breslau, the ophthalmo-hygienist; Manz in Freiburg; Dor in Lyons, formerly in Bern; Pflüger in Bern; Laqueur, Roeder and Jacob Stilling in Strassburg; Hirschberg in Berlin, a practitioner and investigator; Von Hippel in Giessen; Sattler in Giessen, Erlangen and Prague; J. Michel in Würzburg; Iwanoff (died 1880), an important pathological anatomist belonging to the German school; Schiess-Gemuseus in Basel; Kuhnt in Jena; Magnus in Breslau; Fuchs and von Reuss in Vienna; Samelson in Cologne; Waldau in Berlin; Rudolph Berlin in Stuttgart; Mauthner in Vienna; Voelckers in Kiel; Schirmer in Greifswald, and others.

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[1] See page 968.

g. The Dutch,

like the Italians, furnish the most striking proof that with the grade of development of the political importance of a people and the general culture associated therewith, the medical sciences likewise rise and fall. Since the 17th century, the golden age of Holland, its medicine has never again attained a dominating influence, and least of all the surgery of this land, an art to which the Dutch apparently possess little or no natural disposition.

Considerable reputation was gained by

Pieter Hendriksz (1779–1845),

professor in Groningen (Ordeelkundige beschryving van eenige der voornaamste heelkundige operatiën verrigt in het nosocomium academicum te Groningen 1810–1815, Groningen, 1816; Oratio de chirurgorum nostratium laudibus, optimis excolendæ artis chirurgiæ incitamentis, Groningen, 1820; Oratio de medicina et chirurgia non sine utriusque damno separandis, 1829.

Other notable surgeons were: Sebald Justinus Brugmans (1763–1819) in Leyden; Van der Meer (Hist. operat. in div. cap. reg. instit. c. tab., 1829); J. van Maanen (1770–1854) in Groningen and Amsterdam; Ant. Gerh. van Onsenoort (1782–1841) in Utrecht, who likewise devoted attention to ophthalmology; J. C. Broers (1795–1847) in Leyden; Christiaan Bernard Tilanus (1796–1883), an eminent surgeon for 45 years a teacher in the Athenæum in Amsterdam, and others. — Among the more recent professors of surgery in the universities of Holland are: Jan Hissink Jansen (1816–1885), Hans Rudolph Ranke (1849–1887) of Kaiserswerth, a famous operator and philanthropist, and Willem M. H. Saenger in Groningen; Machiel Polano (1813–1878) and Frederik Willem Krieger in Leyden; L. C. van Goudoever in Utrecht; Ant. Hendrik Schoemaker, Jan W. R. Tilanus and J. Mezger (born in Amsterdam in 1839), who has brought massage into scientific respect in surgery and thereby gained for himself riches and honor, are active teachers in Amsterdam. Tilanus succeeded his father in the Athenæum, founded in 1632 and raised into a university in 1877. — Finally in the single surgical specialty of ophthalmology Willem Mensert (1780–1848) in Amsterdam, as well as van Onsenoort in Utrecht, were active workers, while Frans Cornelis Donders (1818–1889) in Utrecht, where he was Prof. of Physiology — this branch and ophthalmology were always taught by the same professor — by his brilliant labors became the most important representative of this specialty.

Donders began his studies in 1835 at the army medical school in Utrecht, graduated at Leyden in 1840, was for two years a military-physician in Vlissingen and the Hague, and was then appointed teacher of anatomy and physiology in the army medical school. In 1847 he became a professor in the university of Utrecht and practised also as an ophthalmologist. In 1851 he went to London and made the acquaintance of Bowman, von Graefe and others, and from this time forward was a co-laborer with the first two physicians. The "Nederlandsch Gasthuis vor Ooglijders", erected in 1858, was placed under the charge of Donders. On the death of Schroeder van der Kolk he was appointed professor of physiology, and resigned ophthalmological practice and teaching almost entirely to Snellen. The new physiological laboratory erected in 1866 was also placed under the direction of Donders, who at the age of 70 retired from active duties. His most important works are: "Die Anomalien der Refraction und Accommodation", German by O. Becker, 2d edition, Vienna, 1887; an English translation by W. D. Moore, London, 1864; "Astigmatismus und cylindr. Glaeser", Berlin 1862; "Physiologie des Menschen" (Ernährung) 2d edition, Leipzig, 1859; "Der Stoffwechsel als die Quelle der Eigenwärme bei Pflanzen und Thieren", Wiesbaden, 1847; "De justa necessitudine scientiam inter et artem medicam, et de utriusque juribus ac mutuis officiis", Prague, 1853. Donders was also co-editor of "Graefe's Archiv" and author of numerous dissertations. We owe to him also the so-called "Donders' law of the movements of the ocular muscles"; the rapidity of the psychical process etc.

Distinguished ophthalmologists of Belgium are: Florent Cunier (1812–1853) and Salomon Louis Fallot (1783–1873), with Evariste Warlomont of Brussels, recently the successor of Cunier in the editorship of the "Annales d'oculistique", which he founded. — Among the

h. Swedes,

Carl Johann af Eckström (born 1793), an army-surgeon in the war against Napoleon, distinguished himself about the beginning of the century as a busy practical surgeon and surgical writer. — More recently we should mention: Carl Gustaf Santesson (1819–1886), Prof. in Stockholm and a famous member of the "Carolinische Institut", and Jacob August Estlaender (1831–1881), Prof. of surgery in Helsingfors.

i. Norwegians.

In the national university of Christiania Magnus Andreas Thulstrup (1769–1844) was the first professor of surgery and obstetrics. Karl Wilhelm Boeck (1808–1875), Prof. of operative surgery, diseases of the skin and syphilis in the same university, became famous as a syphilographer (syphilization, 1852). Christen Heiberg (1799–1872) of Bergen, the founder of a family of physicians, was appointed in 1836 professor of surgery and ophthalmology in the University of Christiania, [and surgeon-in-chief of the Royal Hospital. His younger brother Johan Fritzner Heiberg (1805–1883), Surgeon General of the Norwegian army, who exerted an excellent influence in elevating the position of army-physicians in Norway;] Hjalmar Heiberg, son of Christen and Prof. of pathological anatomy and general pathology in the University of Christiania (Die puerperalen und pyämischen Processe, 1873); Julius Nicolaysen, Prof. of special and clinical surgery in Christiana; Johan S. A. Hjort, Prof. of operative surgery and ophthalmology; Johan Lauritz Bidenkap, Clinical Prof. of syphilis and diseases of the skin, [and Gerhard Henrik Armauer Hansen of Bergen, a well-known student of the leprosy,] also deserve mention. — Among the

k. Danes,

Mathias Saxtorph (1740–1800), Prof. of Midwifery in Copenhagen, acquired great reputation, [and in conjunction with Urban B. Aaskow (1742–1806) and J. W. Guldbrand (1744–1809), as a Commission for the Advancement of Surgery, was influential in the establishment of the Copenhagen Lying-in Hospital in 1785. He also prepared the first handbook of anatomy in the Danish language.] His son Johan Sylvester Saxtorph (1772–1840) was professor of surgery and midwifery in the university of Copenhagen, [and the son of the latter, Mathias Hieronymus Saxtorph, is at present professor of surgery in the same institution.] Anders Georg Drachmann (born 1810), an eminent specialist in orthopædic surgery in Copenhagen, also merits notice in this connexion.

Quite recently (1888) Edmund Hansen Grut has been appointed the first professor of ophthalmology in Copenhagen, the department of ophthalmology having been heretofore assigned to the chair of surgery. Grut had organized an ophthalmic clinic in Copenhagen as early as 1863.

The surgery of the

l. Russians,

in our century can point to some generally known and famous representatives, most of whom, however, acquired their education in Germany. Among these medical immigrants into Russia were: the ophthalmologist Theodor H. W. Lerche (1791–1863) of Braunschweig, who established in St. Petersburg in 1824 the first ophthalmic clinic in Russia and became the oculist-in-ordinary of the emperor. Lerche was succeeded in the ophthalmic hospital by Christian Salomon, the latter by Lerche Jr. (died 1863), Lerche by Robert Blessig (1830–1878), upon whose death the direction of the hospital was given to John Magawly, an Irish physician, who is at present oculist-in-ordinary to the emperor and the most eminent oculist in St. Petersburg. Other well-known German surgeons in Russia are: Martin Wilhelm von Mandt (1800–1858), formerly a professor in Greifswald and subsequently ordinary physician to the emperor Nicholas; Joh. Ferd. Heyfelder (1798–1869), Stromeyer's successor in Erlangen, who performed in 1844 the first total extirpation of both superior maxillary bones, and Georg F. B. Adelmann (1811–1888) of Fulda, Prof. of surgery and midwifery in Dorpat and the father-in-law of Bergmann, the first surgeon of the first German university, who was dismissed for the sake of Mackenzie by the second German emperor. But among the Russians themselves surgery has found some distinguished national representatives, as e. g. Nikolai Iwanowich Pirogoff (Pirogow, 1810–1881), a pupil of Dieffenbach, who retired from his position in 1866.

Pirogoff was likewise an eminent anatomist and the first to study anatomy by means of sections of frozen bodies. He was also very active in the introduction of the system of dispersion of the sick and wounded, and generally in the improvement of military hygiene in Russia. He used his influence too in the popularization of the plaster of Paris splint, and a well-known amputation of the foot bears his name. His son Nic. Iwanowich Pirogoff is a busy and reputable surgeon of St. Petersburg.

We should also mention among the native Russian surgeons Julius Szymanowski (1829–1868), Prof. of operative and military surgery in Kiew and a surgeon of the first rank, who unfortunately died at an early age. — From these examples we see that even Russia, which in our century is striving to take the lead in all departments of civilization, the medical sciences participate among the first in the advances of general culture — we have noticed the same fact among the peoples mentioned in the beginning of this work — and then develop rapidly and grow luxuriantly.

Karl Johann von Seydlitz (1798–1885), Prof. of clinical medicine in the medic.-chirurg. Academie at St. Petersburg; Wilhelm Koch in Dorpat and Ed. von Wahl, Prof. of surgery in Dorpat, also merit notice. In

m. Finland,

Karl Daniel von Haartman (1792–1878) was an active surgeon and obstetrician in the University of Helsingfors, founded in 1827 in place of the university at Abo. His successor in the professorship of surgery is Fredrik Salzman.

5. MIDWIFERY.

The midwifery of our century, particularly German midwifery, is specially distinguished by the fact that, although it has been transferred entirely (ordinary cases and aid excepted) into the hands of men, it has given up, so to speak, the operative character which, particularly as the result of the invention of the forceps, it still possessed in great part in the 18th century. Operative interference accordingly is limited as much as possible, and only permitted when all the means that allow the natural forces to accomplish the parturient act have been exhausted. The determination of these limits demanded, above all, the most careful observation of natural labor, and for this purpose public lying-in hospitals have been placed at the service of both teachers and students in Germany and France. On the other hand, however, the required operative measures have been in every way perfected through our advances in technique, as well instrumental as obstetrical proper, and the number of our dynamic expedients has been increased. Both these results have been accomplished by the utilization of all the methods standing at the service of modern science. Above all, it has been an advantage to midwifery that it has been studied and taught by thoroughly scientific men, and generally as a special branch, without falling scientifically and practically, like other branches, into the hands of exclusive specialists, but has always preserved its connexion with general medicine and maintained the latter in its service. Thus it has resulted that, in addition to the physiology of labor, especially the general, as well as local diseases of the mother and child during pregnancy and after birth, together with the hygienic portion of midwifery, have found eminent students. It has drawn too more and more into its sphere the allied subjects of gynæcology (whose methods of treatment have recently degenerated too much into mechanico-physical and operative measures) and the diseases of children. Moreover it has kept itself free, as far as possible, from theoretic speculations, and has never lost sight of the practical and humane side of its department. From all the influences thus mentioned and to be shown in the course of our account of this branch, midwifery has attained among the branches of medicine a specially rounded and, if you will, a more complete form, and is surpassed by none in its beneficent results in and for our daily life. Indeed it even outstrips most of the other departments of medicine in a most gratifying way, while the tolerance of the female organism in respect to, and during, its most important physical function, contributes also its share to the success of this important branch. One of the most beneficent advances in midwifery is the cleanliness, *vulgo* antisepticism, introduced by Semmelweis. and which has deprived the lying-in period (particularly in hospitals) of its horrors, as the inventions mentioned above have deprived labor of its sting. The latter object has been attained in a great measure by the use of chloroform, the chief boon offered by the 19th century to childbirth.

a. The Germans,

in this branch of medicine, speedily attained the precedence, particularly through the efforts of

LUCAS JOHANN BOËR (1752–1835),

properly Boogers, which latter name he was forced to abandon because Joseph II. declined to send to France anyone "afflicted with such a discordant cognomen". Boër was born at Uffenheim in Bavaria, was the son of a falconer and was originally designed for the ministry. While studying with this object in Würzburg he became known to C. C. von Siebold, who induced his parents to strip off the gown of the monk and replace it with the robe of the surgeon. Subsequently, on the recommendation of von Siebold, Boër received from the bishop of Würzburg the means to continue his studies in Vienna, but squandered them at once in academic vices. Thus deprived of his means of maintenance and in absolute poverty, he supported himself for a long time by watching with the sick, correcting proofs etc., until on the advice of Rechberger, the ordinary physician of Maria Theresa, he began in 1778 the study of midwifery, and was speedily appointed assistant and surgeon to the orphan asylum (1784). Next, by the aid of Joseph II., he was enabled to visit first Holland, then Paris and then London. In Paris, through the influence of Marie Antoinette, he was admitted into the lying-in institutions which were still closed to men, and in London attended the private hospital of Leake, and in both these cities he listened to the teachings of the most famous teachers of midwifery. He returned in 1788 by way of France and Italy to Vienna, where he was appointed surgeon-in-ordinary, and soon after professor of midwifery in the lying-in hospital. The latter position he continued to hold until 1822, in which year he retired from active duty. Shortly after entering upon his duties as professor of midwifery he had the misfortune to lose an arch-duchess whom he had delivered with the forceps, and from whom he had removed the placenta manually, and this mishap led to an active persecution on the part of his colleagues. The emperor Joseph II., however, more clear-sighted, did not count his misfortune as a fault. — After his retirement Boër was very active with his pen.

Boër's imperishable service to medicine is found in the consistent carrying out of a sober and healthy observation in midwifery (Solayrès de Renhac and others had, indeed, opened the way), combined with a treatment free from all artifice (labor-stools etc.), natural, and exempt from frequent operations. The following passage may serve as an example of his unprejudiced method of observation:

"One should not form for himself any ideal of imaginary pains, and observe the actual pains in each individual case in accordance with this supposed model. Otherwise in most labors he will find something to disapprove and some opportunity for dabbling. On the contrary, every case must be judged upon its own merits. . . . . However long too the function may continue to be performed in this natural way, it never constitutes properly a difficult labor, but merely a tedious one." We should never manage "as if nature had given up her work of parturition." (See Siebold.)

Diametrically opposite principles were defended by

FRIEDRICH BENJAMIN OSIANDER (1759–1822) of Zell in Würtemberg, originally a practising physician at Kirchheim and then professor of midwifery in

Göttingen. He was a pupil of Stein in Kassel, and as such a great advocate of the forceps, an instrument which he handled with such skill that when they failed in their object in a contracted pelvis he considered Cæsarean section indicated rather than perforation of the head. (In 2540 cases of labor he terminated 1016 with the forceps!) He contested the value of artificial premature delivery, extracted in breech-presentations etc., and invented (an evidence of his instrumental bent) a great number of instruments, including a thimble for rupturing the membranes, an instrument to measure the inclination of the pelvis, a lever to remove the fœtus in abortions, a balance, a longimeter to determine the circumference of the head etc.

A practical follower of Boër's principles, though he was not one of his pupils — he had been educated in Würzburg under C. C. von Siebold — was

WILHELM JOSEPH SCHMITT (1760–1827) of Lorch on the Rhine.

professor of midwifery at the Josephinum, who advocated the connexion of midwifery and general medicine and, like a true physician, emphasized the humane character and mission of medical art. Hence he rejected all rash treatment, limited the employment of the forceps and recommended in their use the simple position on the back upon an ordinary bed, discarding labor-stools and special labor-beds. He likewise called attention to spontaneous version, taught that agglutination of the os uteri was one of the hindrances of labor, that fissures of the skull were possible in natural labor with a contracted pelvis, and approved of version by the breech, the latter a doctrine taught also by J. W. Betschler of Breslau (died 1865; Ueber die Hilfe der Natur zur Beendigung der Geburt, 1844). Schmitt likewise taught the spiral course of the head in labor, advanced the doctrine of doubtful pregnancy etc., and specially emphasized the exercise of the sense of touch as one of the chief requisites for an obstetrician. He also distinguished himself in surgery. — One of the most eminent of the skilful promoters of German midwifery was

JUSTUS HEINRICH WIGAND (1769–1817) of Esthonia.

who settled in Hamburg, because through a quarrel with the Russian examiners he could not practise in his native place. He devoted attention to cephalic version, particularly to its accomplishment by external manipulation, was the first to recommend tamponing the vagina in placenta prævia, after perforation of the head preferred to leave the completion of delivery to nature, after Cæsarean section advised the removal of the placenta through the os uteri and in post partum hæmorrhage recommended friction of the os uteri and clitoris. His most famous work was entitled "Die Geburt des Menschen".

In Mayence, until the abolition in 1798 of the university of that city,

JOH. PETER WEIDMANN (1751–1819),

who has been already mentioned, was an active professor. Subsequently he officiated as a simple teacher of midwifery, neglecting neither the working of nature, nor, when necessary, the aid of art

AD. FRIEDR. NOLDE (1764–1813),

finally professor in Halle, acquired a famous name by his improved division of the doctrines of midwifery into a physiological, pathologico-semeiotic and practical part, while the younger

JOH. CHRISTIAN STARK (1769–1837),

professor of surgery and midwifery in Jena, distinguished himself by a book for midwives and by hospital reports. On the other hand,

LUDWIG FRIEDRICH VON FRORIEP (1779–1847),

finally in Weimar, attained equal distinction by means of a good text-book (5th edition, 1818), in which he directed general attention to the subject of artificial abortion. He was a pupil of Boër. The teachings of Boër were also embraced by his pupil

JOH. CHRIST. GOTTFRIED JÖRG (1779–1856) in Leipzig,

who advocated the use of "birth-cushions" (Geburtskissen) and the removal of the forceps before the complete delivery of the head in order to spare the perineum, and invented a trepan-like perforator (Wechsung had indicated such an instrument as early as 1757), while he was an opponent of artificial abortion and the tampon in placenta prævia. (Handbuch der speciellen Therapie für Aerzte am Geburtsbette, 1835; Handbuch der Krankheiten des Weibes, 1832 etc.)—An important and highly deserving obstetrician, particularly as regards the theory of the pelvis and the mechanism of labor, a subject which he created and built up into a science, was the eloquent and witty pupil of the Jesuits (though, according to Georg Weber he was by no means a follower of Jesuitical principles in his life),

FRANZ CARL NÄGELE (1777–1851) in Heidelberg,

to whom we owe much of our knowledge of the obliquely contracted, rachitic etc. pelvis, the determination of the inclination of the pelvis, computation of the duration of pregnancy, improvement of instruments (Nagele's lock etc), and whose doctrines were widely diffused and long accepted. His son

HERMANN FR. J. NÄGELE (died 1851),

who also practised in Heidelberg, likewise rendered good service in the study of the mechanism of labor, the obliquely contracted pelvis, the application of auscultation to pregnancy and labor etc. (Lehrbuch der Geburtshilfe, 7th edition, 1873, edited by W. L. Grenser.)—The father-in-law of Nagele Sr. was

F. A. MAY (1742–1814),

a professor in Heidelberg, who has been already mentioned as a hygienist. He was the first to recommend artificial abortion, but this operation was first performed in Germany in 1804 by

CARL WENZEL (1769–1827) in Frankfort-on-the-Main.

The nephew of the elder Stein,

GEORG WILHELM STEIN (1773–1870),

was the worthy successor of his uncle in Bonn, and was the earliest to call attention to contractions of the pelvis due to hip-disease, fractures and exostoses.

The Berlin professor of midwifery,

ADAM ELIAS VON SIEBOLD[1] (1775–1828),

a pupil of Boër, as well as his more famous son, the classical historian of midwifery

ED. CARL CASPAR VON SIEBOLD (1801–1861),

professor in Gottingen, distinguished themselves in many directions. The successor of the elder Siebold, and the predecessor of Martin, in Berlin was

DIETRICH H. W. BUSCH (1788–1858),

who was likewise an eminent gynæcologist. He devoted special attention to cephalic version, cephalotripsy, artificial abortion etc (Lehrbuch der Geburtskunde, 5th ed, 1849; Geschlechtsleben des Weibes etc.) The successor of Elias von Siebold in Würzburg was

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[1] The name of Siebold includes also two doctresses of midwifery. The first was an honorary doctress of Giessen and was named Regine Josephe von Siebold; the second was Marianne Theodora Charlotte von Siebold (1788–1859), who married a Heidenreich, and who, after passing her examinations and holding her disputation, also in Giessen, became a doctor of midwifery and practised with great success in Darmstadt and other places to which she was often summoned.

JOSEPH D'OUTREPONT (1778–1845) of Malmedy,

who discussed cephalic and spontaneous version and artificial abortion. In the latter operation he discarded ergot as injurious to the child. Schoenlein, with that charity characteristic of medical colleagues, is said to have remarked of d'Outrepont that if the uterus was taken away from him he would have nothing whatever left.

Under the presidency of d'Outrepont C. J. Haus (born 1799) wrote on auscultation in pregnancy, and Ad. Ulsamer composed a treatise on the same subject.

The versatile and original, but conceited

FERD. AUG. MAX FRANZ VON RITGEN (1787–1867) of Wulfen in Westphalia,

professor of midwifery and at an earlier period of surgery also in Giessen, has recently regained in many respects his merited recognition. The author of a treatise entitled "Geburtshilfliche Operationen" (1820), he discussed protection of the perineum, pelvic contraction, artificial abortion, the mechanism of labor, fœtal positions, puncture of the membranes, and recommended bandaging the legs in hæmorrhage in order to preserve sufficient blood for the central organs etc. The latter procedure was subsequently revived under the name of "autoinfusion". Ritgen was a scion of the school of natural philosophy, and embraced also the doctrine of animal magnetism. At a later period he inclined to the sect of natural historical physicians and invented some marvellous names for diseases, e. g. "tokodomycodoritis maligna" for diphtheria of the vagina etc. At an advanced age he drifted away into alienistic medicine, botany, comets etc., and also distinguished himself as an investigator of the history of the mechanism of labor. The results of these investigations he had published by his pupils under the form of inaugural treatises.— Ritgen was often an opponent of the professor in Halle,

ANT. FR. HOHL (1794–1862),

who rendered good service to medicine by his labors on the pathology of the pelvis (Zur Pathologie des Beckens, two parts), obstetrical examination (Die geburtshilfliche Exploration, two parts), the signs of pregnancy, the birth of malformed children, and as author of a very good text-book (Lehrbuch der Geburtshilfe, 2d edition, 1862).

ANT. JOH. JUNGMANN (1775–1854),

professor in Prague, was a pupil of Boër and an influential teacher.

W. H. NIEMEYER (1788–1840) in Halle

discussed twin-births, and invented an instrument for rupture of the membranes and a trepan-perforator. — An active teacher in Dresden was the versatile

KARL GUSTAV CARUS (1789–1869),

a follower of the school of natural philosophy and the father of the idea of the "unconscious". He was a fertile writer on zootomy, comparative physiology, the symbolism of the human form, "Psyche", "Physis" etc. In opposition to him

LUDWIG JUL. CASPAR MENDE (1779–1869),

professor in Greifswald and subsequently in Gottingen, distinguished himself as a memorable writer on forensic medicine and an historian of this department.

HERMANN FRIEDRICH KILIAN (1800–1863) in Bonn

rendered special service to the subject of the obstetrical operations.

IGNAZ SCHWÖRER (1800–1860) in Freiburg

likewise wrote on midwifery and forensic medicine.

JULIUS VICTOR SCHOELLER (1811–1883)

was an eminent obstetrical teacher in Berlin (Die künstliche Frühgeburt bewirkt durch den Tampon. Berlin, 1842), and inventor of an "Omphalosoter" for replacement of the prolapsed cord.

JOH. EUG. ROSSHIRT (1795–1872) in Erlangen,

CARL CHRISTOPHER HÜTER (1803–1857) in Marburg,

the earlier

HERMANN JOS. BRÜNNINGHAUSEN (1761–1834) in Würzburg,

inventor of a forceps and perforator and an advocate of the use of sponge tents for the induction of abortion, and J. Bapt. Schmidt (1822–1884) of Forchheim, professor in the school for midwives in Würzburg, were all capable obstetricians.

An active teacher was

CARL ALEX. FERD. KLUGE (1782–1844) in Berlin,

under whose presidency C. A. Lau wrote on auscultation in pregnancy.

FRANZ KIWISCH VON ROTTERAU (1814–1852),

professor in Würzburg and Prague, was an eminent gynæcologist and obstetrician, as was also his still more famous successor in Würzburg,

FR. WILHELM SCANZONI VON LICHTENFELS (born 1821, retired 1887) in Prague.

Both these latter obstetricians were educated in Prague.

Among other German physicians who have rendered service in many different ways to the science of obstetrics are :

E. Lumpe in Vienna (Cursus der practischen Geburtshilfe, 3d. ed., 1854); Karl Sigmund Franz Credé (born 1819; Credé's method of expression of the placenta ; instillation of a two per cent. solution of nitrate of silver in the prevention of blenorrhœal ophthalmia ; with Spiegelberg editor of the "Archiv für Gynaecologie") in Leipzig ; Ludwig Ignaz Philipp Semmelweis (1818–1865) of Ofen, professor in Pesth, misjudged and, indeed, persecuted during life, has won immortal honor by his revival of Denman's idea of the communicability of puerperal diseases, and proving that, like pyæmia, they were infectious and that in Vienna they were caused by the attendants upon the anatomical course, who examined parturient women with hands only half clean. He also recommended careful washing with chlorine water before each examination, and thereafter the mortality among lying-in women fell in two months from 12 to 3 per cent. Irritable as he was, and galled by the attacks which his doctrines (in which he anticipated the method of Lister) experienced, he died in the insane asylum at Döbling. Original opponents of the teachings of Semmelweis were : Kiwisch, Virchow, Scanzoni, C. Braun, Seyfert, Betschler, Roser, Hecker, Arnold and almost all physicians of reputation, who expressed their dissent particularly at the "Naturforscherversammlung" at Spires. Among his followers were : Skoda, Michaelis in Kiel, Hebra, Markusovzky, Kesmarszky, Fritsch — and to-day everybody ! Semmelweis, like Robert Mayer, is a witness that in the 19th, as well as in the first century, truth demands her victims, only the discoverers of truth now are no longer crucified, but their names are simply written upon the proscription-list of the lease-holders of science, and they themselves handed over to lunatic asylums! G. A. Michaelis (1798–1848), who immediately and alone among the obstetricians accepted and followed the teachings of Semmelweis, because he believed that his niece, whom he had confined, had fallen a victim to the want of cleanliness of his instruments etc. C. C. Th. Litzmann (born 1815) in Kiel, who made careful studies of normal and deformed pelves; Carl and Gustav Braun (the colpeurynter in Vienna; F. H. Arneth, J. Chiari and J. Späth also in Vienna; E. Martin (1809–1875) in Berlin, an advocate of external version and an eminent gynæcologist; Anselm Martin (1809–1883) in Munich, extraordinary professor and superintendent of the lying-in hospital until 1859, and then an obstetrician of reputation as well as a writer; B. Seyfert (died 1870 in Prague, the author of the Prague school-forceps; Veit in Bonn; Karl Schröder (1838–1887) in Berlin, author of a "Lehrbuch der Geburtshilfe" (1870, 8th ed., 1884) and a "Handbuch der Krankheiten der weiblich Geschlechtsorgane" (1874, 7th ed. 1886), who, like so many modern university professors, owes to these two text-books his extensive reputation. He was also active in the introduction of ovariotomy into Germany; Hecker (1826–1882) in Munich; Lange in Heidelberg; R. Olshausen in Halle; O. Spiegelberg (1830–1881), who advocated tapping for diagnostic purposes in ovarian tumors etc.; Birnbaum and F. A. Kehrer in Heidelberg, who wrote on comparative parturition and demonstrated sterility in the male by a test-coitus and subsequent examination of the collected semen; Frankenhäuser and B. S. Schultze (son of the Greifswald anatomist and physiologist, Siegmund Schultze — 1795–1877 — and brother of the famous anatomist and microscopist Max Schultze, the investigator of the retina) in Jena; R. Dohrn in Marburg; A. Hegar in Freiburg, who performed the first extirpation of the normal ovaries, i. e. female castration, for neuralgia, 1872; Freund in Strassburg and subsequently in Berlin; Kristeller in Berlin and August Breisky (1832–1889) of Klattau in Bohemia, professor successively in Salzburg, Bern, Prague (1874) and Vienna (1886), where he succeeded Spaeth. He studied in Prague (particularly pathological anatomy under Treitz and gynæcology under Seyfert) and is well-known as one of the pioneers of obstetrical antisepticism, as an operative gynæcologist, and as the first describer of kraurosis vulvæ; P. Müller in Bern; W. Lange (born 1813, shot himself 1881) of Klein-Iser in Bohemia, a scion of the Prague school, first in Innsbruck and then Nägele's successor in Heidelberg; A. Gusserow (born 1836), formerly in Strassburg, now in Berlin; H. Hildebrand (1833–1882) in Königsberg; Schwartz in Göttingen; F. Winckel, first in Dresden, then in Munich; his successor in Dresden, Gerhardt Leopold; Kuhn in Salzburg; C. Hennig in Leipzig; Virgil, Ritter von Mayrhofer (1815–1877) in Innsbruck; Schatz in Rostock; Zweifel in Erlangen; C. Mayer in Berlin; J. Amman in Munich; L. Kleinwächter in Innsbruck; Hermann Beigel (1830–1879), a well-known gynæcologist of Vienna, etc. Most of the physicians last mentioned are likewise skilful gynæcologists, some of them also devoted to the diseases of children, though since the excessive growth of specialism this is becoming more rare.

Among specialists in the diseases of children and writers in this department in Germany, which during the course of the present century can point to an extremely large number of translations from the English and French, we may notice the following eminent representatives: Ferd. Jahn (System der Kinderkrankheiten, 1807); Jörg (Handbuch zum Erkennen und Heilen der Kinderkrankheiten, 1826); F. L. Meissner (Kinderkrankheiten, several editions); W. Rau (Handbuch der Kinderkrankheiten, 1832); J. Wendt (Kinderkrankheiten, 3d. ed., 1835); A. Henke (Handbuch der Kinderkrankheiten, 1831); Ch. F. Harless; J. L. Loebisch (Studien über Kinderheilkunde, 1848); F. J. von Mezler; Schnitzer and Wolff (Handbuch der Kinderkrankheiten, 1843); E. Henoch; C. Hennig (Lehrbuch der Krankheiten des Kindes in seinen verschiedenen Alterstufen, 1859); J. B. Ullersperger (1797–1878); Alf. Vogel (Lehrbuch der Kinderkrankheiten, 8th ed., 1876, a new edition is being edited by Phil. Biedert); a cyclopædia under the direction of Gerhardt; and the "Journal für Kinderkrankheiten", among whose contributors are F. J. Behrend, A. Hildebrandt, Aug. von Hauner (died 1884) in Munich, J. Bokai (died 1884) in Pesth, Mauthner and many others.

b. The French

continue, far more than the Germans, to occupy the same stand-point which they held in the 18th century in midwifery, and are accordingly still rather inclined to instrumental interference.

Among the well-known contributions of the French to this department we may mention first the application of auscultation to the determination of the life and death of the child, the existence of twin or abdominal pregnancy and the seat of the placenta, which was first brought forward by

J. A. LEJUMEAU DE KERGARADEC (1788–1877)

in 1822, without knowing that Mayor of Geneva had heard the sounds of the fœtal heart in 1818; then the so-called cephalotripsy, which was taught from 1829 by

A. BAUDELOCQUE,

a nephew of the eminent obstetrician. By this operation it was believed possible to deliver the child in a pelvis whose conjugate did not exceed two inches, without perforation of the head.

J. P. MAYGRIER (1771–1834)

reduced the 96 fœtal positions of Baudelocque to half that number, and

MARIE LOUISE LACHAPELLE (1769–1821),

chief midwife to the "Hospice de la maternité" (opened in 1797), who had observed 40,000 cases of labor, reduced the number again to 22. On the other hand, her pupil

MARIE ANNE VICTOIRE BOIVIN (1773–1841)

constructed and portrayed some curious fœtal positions.

Besides Joseph Capuron (1767–1850), Louis Charles de Deneux (1767–1846), a pupil of Baudelocque, and

CLAUDE MARIE GARDIEN (1767–1838),

a famous teacher, familiar to some extent with even the contributions of foreign authorities,

ANTOINE DUBOIS (1756–1837),

the successor of the elder Baudelocque in the Maternité, particularly distinguished himself as a teacher, and became well-known too in a wide circle by his confinement of Maria Louisa. His son

PAUL DUBOIS (1795–1871)

met with the same good fortune in his confinement of the second empress, and was a meritorious cultivator of obstetric auscultation, while

E. DUBOIS (died 1877) in Paris

was a well-known gynæcologist.

J. A. H. DEPAUL (1811–1883),

Prof. at the Hôpital des cliniques, also devoted attention particularly to obstetrical auscultation, and was an eminent obstetrician as well as editor of the "Archives de tocologie" etc.

The old obstetrical reputation of Strassburg was maintained by

JACOB FRIEDRICH SCHWEIGHÄUSER (1766–1842),

JOHANN G. C. FRIEDRICH LOBSTEIN (1777–1838) of Giessen.

R. P. FLAMANT (1762–1832),

who as early as 1795 revived the memory of cephalic version, and

JOS. ALEXIS STOLTZ (born 1803),

Flamant's successor, who was one of the first to practise artificial abortion in France. All these physicians acted as a connecting link between France and Germany.

The surgeon Armand Louis Marie Alfred Velpeau (1795–1867) also wrote on obstetrics, as well as François Joseph Moreau (1789–1862), [physician to the Maternité and obstetrician to the princesses of the Orleans family (perforation of the perineum);] F. Duparcque (ruptures etc. of uterus, vagina and perineum); Lacour; Paulin Cazeaux (1808–1862) [of Paris and author of the well-known "Traité théorique et pratique de l'art des accouchements", 1840, 8th ed, 1870;] Nicolas Chailly-Honoré (1805–1866), [Chef de clinique at the obstetrical clinic of the Faculty, and an eminent obstetrician of Paris;] F. K. Bayley; Dubreuilhe; Joseph Dominique Ernest Putégnat (1809–1876), [who was rather a general practitioner and writer on various medical subjects;] Chassagny and Eugène Armand Després at the Hôpital Cochin. We should also mention: A. H. P. Courty (1819–1886) in Montpellier; Jules Péan of the Hôpital Saint-Louis; L. Urdy; Liégeard; Charles James Campbell (1820–1879), [a physician of English parentage settled in Paris, who was active in the introduction of obstetrical anæsthesia into France, and one of the most popular and successful obstetricians in Paris; and others. To whom we may add Stéphane Tarnier, Surgeon-in-chief of the Maison et École d'accouchement and inventor of a well-known forceps, and the gynæcological authors mentioned on pp. 906–907.]

c. Italians.

Among the Italians no physician since the days of Paolo Assalini (1759–1840) and Francesco Asdrubali (1756–1832) has attained any high reputation among foreigners as an obstetrician. On the other hand, however, the literary activity of Italian physicians in the department of midwifery has been very lively.

In 1818 men were for the first time permitted to visit the lying-in institutions of Parma, and a chair of midwifery was established in Pisa in 1839 and in Florence in 1840. In Piedmont obstetrical clinics were founded, in Venice and Palermo in 1841, in Genoa 1852 etc.

Among the Italian obstetricians we should mention: Gennaro Galbiati (1776–1848) of Naples; Bigeschi; M. C. Frari, author of the first Italian treatise on obstetrical operations in 1844; J. D. Nardo; F. Marzolo; Trinchinetti; Salvatore de Renzi (1800–1872), [Prof. of the history of medicine in the University of Naples and the well-known author of the "Storia della medicina italiana" (1845–48);] Verducci; Ciccone; Fabbri; Pietro Vannoni of Florence; Biancini; Bongiovanni; Bili; Giuseppe Maria Canella (1788–1829) in Trent; Pietro Lazzati (1836–1871) in Milan; Cesare Belluzzi (auscultation for the determination of the fœtal position); Carlo Massarenti (on the same subject); J. Casati in Milan; Ferdinando Verardini of Bologna, chief physician to the Ospedale Maggiore; Eduardo Porro in Milan (Porro's operation or "Utero-ovarian amputation as completive of the Cæsarean operation", 1876); Antonio Rota; Aloysio Valenta in Laibach (an Italian only in nationality); Giustino Mayer (1830–1879; conversely a German with an Italian Christian name) in Naples; G. Calderini in Turin; Teodoro Lovati (1800–1872) in Pavia; Luigi Pastorello (1811–1863) in Padua etc. — Still fewer names and works relating to midwifery among the

d. Spaniards

are of sufficient importance to have attained general knowledge abroad up to the present time. We may notice, however, among their quite recent writers on midwifery: Dr. Torres (died 1888), professor of obstetrics in Madrid; Francesco de Cortejarena y Aldeo and Pedro Brogeras y Lopez. Schroeder's work was also translated into Spanish under the title of "Manual de las enfermedadas de los organos sexuales de la mujer", by A. Vincencio in 1887.

e. The English

in their midwifery follow, on the one hand, the principle of protecting the mother by utilizing to their utmost the natural forces of parturition — and in this department they have appropriated the use of chloroform to a far greater degree than any other people — and, on the other hand and connected therewith, the principle of preserving the mother rather than the child, with of course the eventual sacrifice of the latter for the sake of the mother. Hence has resulted the frequency in English practice of perforation of the head and of artificial abortion, as well as the rarity of the employment of the forceps in difficult labors and the avoidance of Cæsarean section.

This trust in the powers of nature and avoidance of the use of the forceps went so far that in 1819 Sir Richard Croft, obstetrician to the princess Charlotte upon whose life depended the hope of the dynasty, permitted the princess to remain in labor 52 hours, when the child was born dead and the mother died six hours later. Croft, however, shot himself through chagrin over his mismanagement!

Still it would seem that a revolution is taking place in English opinions!—Since when and how this change has gradually taken place may be seen very readily from the following statistics. "According to the statistical reports of the Dublin Lying-in Hospital, under the direction of Dr. Joseph Clarke, from 1787 to 1794 in 10,387 cases of labor the forceps were employed only 14 times; six of these cases terminated in the death of the mother. On the other hand, 49 women were delivered by craniotomy, 16 of them with fatal results. From 1815–1821, under the Mastership of Labatt, in 21,867 cases of labor the forceps were not employed a single time. From 1826–1833, 16,654 (16,414) cases came under the direction of Collins. Of these 24 were terminated with the forceps, with fatal results in four cases, while craniotomy was performed 118 times. Under Johnson, from 1842–1845, in 6,702 labors the forceps were used in 18 cases, the crotchet in 16 cases and the perforator in 54 cases, with 8 fatal results. Shekleton again resorted to the forceps more frequently, in the period from 1847–1854 using them 220 times in 13,748 cases of labor, with a fatal result in 15 cases. From 1869–1873, Johnston in 4,634 cases applied the forceps in 420 (1 : 11), with 34 deaths (1 : 12), while he had only 20 cases of perforation or craniotomy (1 : 321), with fatal results in 5 cases. In private obstetrical practice too the forceps were for a long time almost forgotten. Thus Clarke, in a midwifery practice of almost fifty years and including 3,878 cases of labor, had resorted to the forceps in a single case only. What an impulse has been given to the employment of the forceps in the last thirty years may be inferred from the communications of Churchill. While in the first half of this period the forceps were employed once in 351 cases of labor, in the last half the proportion increased to 1 : 171, and in private practice to one in sixty."

[According to Churchill (Theory and Practice of Midwifery, Phila., 1863) the *relative* frequency of the use of the forceps among English, French and German obstetricians was: among British practitioners 1 : 249; among the French 1 : 140, and among the Germans 1 : 106. An examination of the tables upon which these conclusions are based shows, however, that they must be regarded at best as very rough approximations. Probably all we can safely say is that the forceps are employed more frequently in German and French obstetric practice than in British, but just how much more frequently it is difficult to decide. Churchill's tables likewise convey the idea that face presentations e. g. occur almost twice as often in German practice as in English. While I know no reason for such a fact, and hence doubt the reliability of the statistics, if such *is* the fact, it is easy to see one reason why the use of the forceps is more frequent in Germany than in Great Britain. There would seem to be also some difference in the frequency of the employment of the forceps by English, Scotch and Irish obstetricians. Thus from the tables of Churchill, analyzed, so far as in my power, with reference to the school of British obstetricians, I find that among the English the forceps were employed once in 511 cases; among the Irish, once in 186 cases, and among the Scotch, once in 101 cases. Still I doubt whether any considerable reliance can be placed upon such comparisons. The disturbing elements of period, conditions of practice (hospital or private), the predominance of a few large practitioners (Ramsbotham e. g. reports 68,435 cases, in which the forceps were employed 112 times) combine to vitiate the conclusions to be drawn from such statistical tables to a degree which makes me very distrustful of them. The tendency to an increased employment of the forceps by British practitioners, as stated by the author, is however undoubtedly true. Whether the increased activity of gynæcological practice is connected genetically therewith is a question which has aroused serious consideration. H.]

Among the more eminent English obstetricians of the present century, most of whom also devoted attention to the diseases of women and children, were:

SAMUEL MERRIMAN (1771–1852),

obstetrician to the Westminster Dispensary and from 1810 to 1825 lecturer on midwifery and the diseases of women and children at the Middlesex Hospital of London, whose "Synopsis of various kinds of difficult parturition, with practical remarks, London, 1814" was sufficiently popular to attain a 5th edition (1839);

SIR CHARLES MANSFIELD CLARKE (1782–1857),

the son of John Clarke, an eminent London obstetrician of the last century. Sir Charles Clarke held the position of surgeon to Queen Charlotte's Lying-in Hospital, and lectured on midwifery and the diseases of women and children from 1804 to 1821. He was also ordinary physician to Queen Charlotte;

AUGUSTUS BOZZI GRANVILLE (1783–1871; his real name was Bozzi),

a native of Milan and an alumnus of Pavia, who settled in London and acquired an extensive practice in midwifery. He was also accoucheur to the Westminster General Dispensary, and published in 1819 a report on the obstetrical practice of that institution in 1818, from which we see that the forceps were employed five times in 640 cases of labor. His literary activity, however, was directed more especially to the subjects of materia medica, the plague, quarantine etc.

ROBERT GOOCH (1784–1830),

physician to the Westminster Lying-in Hospital and lecturer on midwifery in the medical school of St. Bartholomew's Hospital, as well as a popular and successful practitioner in London. His "Account of some of the most important diseases of women", 1829, is perhaps his best known and most highly prized work.

JOHN RAMSBOTHAM, and his more eminent son,

FRANCIS HENRY RAMSBOTHAM (1800–1868),

both lecturers on midwifery at the London Hospital Medical School and highly esteemed obstetricians. The former published some "Practical observations in midwifery" etc., London, 1821–32, while the elaborate work of the latter, "The principles and practice of obstetric medicine and surgery", London, 1841, became one of the most popular text-books of English and American students for a long period. The younger Ramsbotham employed ergot for the purpose of inducing premature labor, a practice which resulted in the death of nearly half the children.

DAVID DAVIS (1777–1841),

accoucheur to the Queen Charlotte Lying-in Hospital and from 1827 lecturer on midwifery at University College, who published in 1825 the "Elements of operative midwifery", and his son

JOHN HALL DAVIS (1811–1884),

from 1863 lecturer on midwifery at the medical school of Middlesex Hospital, and a

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successful and popular London obstetrician. He published in 1858 his "Illustrations of difficult parturition", and in 1865 a second edition containing statistics of 13,783 deliveries, from which we see that he was exceedingly cautious in the use of the forceps (6 times in 7302 cases);

JAMES BLUNDELL,

professor of obstetrics at Guy's Hospital Medical School and physician to the Lying-in Charity of London, and a careful investigator of the subject of transfusion. "The principles and practice of obstetricy", London, 1834;

SIR CHARLES LOCOCK (1799–1875),

a pupil of Brodie and James Hamilton of Edinburgh, physician accoucheur to queen Victoria in all her confinements, and lecturer on midwifery at St. Thomas's and St. Bartholomew's Hospitals, to whom we owe also the discovery of the efficacy of bromide of potassium in the treatment of epilepsy;

ROBERT LEE (1793–1877) of Melrose,

a pupil of the Scotch school, who settled in London and became famous as an obstetrician, as well as an anatomist and physiologist. He occupied the obstetrical chair of the medical school of St. George's Hospital for many years, delivered the Lumleian and Croonian lectures before the College of Physicians, and was particularly distinguished as a student of the anatomy and physiology of the uterus. Of his numerous works the "Elements of midwifery" etc. (1837), "The morbid anatomy of the uterus and its appendages" (1838) and "The anatomy of the nerves of the uterus" (1841) are perhaps best known;

WILLIAM TYLER SMITH (1815–1873),

physician accoucheur to St. Mary's Hospital and author of a well-known and highly esteemed "Manual of obstetrics, theoretical and practical", (1858). In 1860, chiefly through his exertions and influence, the "Obstetrical Society" of London was founded, an organization which has contributed largely to the elevation of obstetrical practice in Great Britain.

John T. Conquest (1789–1866), lecturer on midwifery at St. Bartholomew's Hospital, Michael Ryan (died 1840 or 41) at the North London Medical School, Samuel Ashwell, author of "A practical treatise on parturition" etc., London, 1828, etc. also deserve mention.

Among the more recent teachers of midwifery at the London medical schools are: J. Braxton Hicks and Alfred L. Galabin at Guy's Hospital; J. Matthews Duncan at St. Bartholomew's; Dr. Gervis at St. Thomas's; Dr. Palfrey at the London Hospital Medical School; Dr. Black at the Charing Cross Hospital; William M. Graily Hewitt at University College Hospital; William S. Playfair and Dr. Hayes at King's College Hospital; Dr. Edis at Middlesex Hospital; Robert Barnes at St. George's; Alfred Meadows and Alfred Wiltshire at St. Mary's Hospital; Drs. Potter and Grigg at the Westminster Hospital; Drs. Heywood Smith and Fancourt Barnes at the British Lying-in Hospital, etc.

Among the more eminent obstetricians of the Scotch school we may mention:

JOHN BURNS (1775–1850),

Regius professor of surgery and lecturer on midwifery in the University of Glasgow, who wrote on the anatomy of the gravid uterus, "The principles of midwifery" etc., (1809), and other works, and was the first to advance the view that involution of the uterus depended upon a resorption of its muscular fibres;

JAMES HAMILTON of Edinburgh,

the son of the famous obstetrician Alexander Hamilton, and the successor of his father in the University of Edinburgh, an eminent teacher and writer (Practical observations on various subjects relating to midwifery, 1836 etc.). The Edinburgh obstetrician and gynæcologist of world-wide reputation,

SIR JAMES YOUNG SIMPSON (1811–1870),

the son of a baker, who by dint of his own exertions acquired the preliminary education required to enter the University of Edinburgh. In 1832 he was selected by John Thomson, the professor of pathology, as his assistant, and in 1840, after a sharp struggle with numerous and able competitors, he was appointed to the chair of midwifery now vacant by the death of James Hamilton. In this position he lectured with ever increasing popularity and soon acquired also an enormous practice. In 1847 he was the first to employ ether anæsthesia in midwifery practice, and on November 4th of the same year he substituted chloroform for ether, and laid the announcement of the advantages of chloroform before the Edinburgh Medico-Chirurgical Society one week later. Of his other contributions to surgery and gynæcology we have space merely to mention the wire suture, the invention of acupressure, the uterine sound, the dilatation of the cervix uteri by means of sponge-tents for diagnostic purposes, a special midwifery forceps and, above all, his investigations into the mortality following operations in large and small hospitals, a work which contributed largely to the diffusion of correct views on the subject of hospital hygiene. Of his very numerous writings we can notice only: "Anæsthesia; or the employment of chloroform and ether in surgery, midwifery" etc. (1849); "Hospitalism" etc. (Brit. Med. Journal, 1869); "Iron-thread sutures and splints in vesico-vaginal fistulæ" (1858); "On acupressure in amputations" (1860); "Tangle-tents" 1864.

JOHN PAGAN (1802–1868) of Glasgow,

Regius professor of midwifery etc. in the University of Glasgow and a popular teacher and obstetrician, who employed the forceps with more freedom than most of his contemporaries (82 times in 8684 cases);

ANGUS MACDONALD (1836–1886) of Edinburgh,

physician to the Royal Maternity Hospital and a highly esteemed obstetrician and gynæcologist, and

WILLIAM LEISHMAN,

the present Regius professor of midwifery in the University of Glasgow, and the well-known author of a valuable text-book "A system of midwifery" etc. (1873).

To the famous Dublin school of midwifery belonged:

JOSEPH CLARKE (1758–1834),

Master of the Dublin Lying-in Hospital, 1787–1793, who in the management of 10,387 cases of labor found occasion to use the forceps but 14 times, though he performed craniotomy no less than 49 times;

HENRY MAUNSELL (1806–1879)

accoucheur to the Wellesley Female Institution and assistant physician to the Magdalen Asylum. In 1835 he was appointed professor of midwifery and the diseases of women and children in the Royal College of Surgeons of Ireland, and wrote "The Dublin practice of midwifery" (Dublin, 1834).

ROBERT COLLINS (1801–1868)

Master of the Dublin Lying-in Hospital from 1826 to 1833, and author of "A practi treatise on midwifery, containing the result of 16,654 births" etc., in which he employed the forceps 24 times and performed craniotomy 79 times.

WILLIAM FETHERSTON H. MONTGOMERY (1797–1859),
the well-known author of "An exposition of the signs and symptoms of pregnancy" (1837), and the chief agent in the establishment of a chair of midwifery in the College of Physicians of Ireland;

FLEETWOOD CHURCHILL (1808–1878),
a native of Nottingham and an alumnus of Edinburgh, who settled in Dublin and in 1856 was appointed professor of midwifery and the diseases of women and children in King's and Queen's College of Physicians in Ireland, a position which he continued to hold until 1864. Until his retirement in 1875 he is said to have enjoyed the largest gynæcological practice in Dublin, and his influence was exerted to increase the frequency of employment of the forceps and to limit the sphere of craniotomy. His valuable text-books "On the theory and practice of midwifery" (1842); "Outlines of the principal diseases of females" etc. (1838) are familar to all English-speaking physicians.

JOHN DENHAM (1804–1887),
an eminent obstetrician of Dublin and Master of the Rotunda Lying-in Hospital;

ALFRED HENRY MACCLINTOCK (1821–1881),
obstetrical assistant of Charles Johnson in the Rotunda Lying-in Hospital, and in connexion with S. L. Hardy author of a valuable report of the obstetrical service of that institution. He also edited for the New Sydenham Society an edition of Smellie's treatise on midwifery, and was the author of an excellent gynæcological treatise entitled "Clinical memoirs on the diseases of women" (1863).

THOMAS EDWARD BEATTY (1801–1872),
master of the South-Eastern Lying-in Hospital of Dublin and one of the founders of the City of Dublin Hospital. His literary activity was displayed chiefly in contributions to the Dublin Quarterly Journal and the Cyclopædia of Practical Medicine.

SIR EDWARD BURROWES SINCLAIR (1824–1882),
assistant physician to the Rotunda Lying-in Hospital, in which position he published, in conjunction with his colleague Dr. Johnston, a treatise on "Practical Midwifery" containing the statistics of 13,748 cases of labor, in which the forceps were applied 200 times and craniotomy performed 130 times. On the retirement of Dr. Churchill, Sinclair succeeded to his position as professor of midwifery in King and Queen's College of Physicians in Ireland. His chief writings relate to extra-uterine pregnancy, the induction of premature labor and deformities of the pelvis.

THOMAS MORE MADDEN (born 1844),
obstetric physician to the Mater Misericordiæ Hospital and consulting physician to the National Lying-in Hospital in Dublin, and an eminent obstetrician of that city. Among his numerous writings we may notice "The Dublin practice of midwifery" (1871); "Contributions to medicine and midwifery" (1874).

The English have no official and sworn midwives, and the only substitute for this class are the obstetrical nurses educated in the various obstetrical schools.

Gynæcology is usually associated in practice with obstetrics and the diseases of children, but of course the logic of circumstances leads certain physicians to devote their principal attention to the subject of diseases of women. Perhaps the foundation of the London "Hospital for Women" in 1842 may serve to mark the epoch when gynæcology had advanced sufficiently to claim the position of an independent specialty.

Among the numerous and very eminent gynæcologists of Great Britain we may mention: Charles Clay of Manchester, who performed ovariotomy in 1842; S. Lane of London, who operated in the following year; Baker Brown (1812–1873); J. Henry Bennet; Charles West; Edward John Tilt; Arthur Wynn Willliams (1819–1886); Sir Thomas Spencer Wells (born 1818), the leading ovariotomist of the world, who performed his first operation in 1857; Protheroe Smith (born 1809); Evory Kennedy of Dublin; Wm. Graily Hewitt; Thomas Keith of Edinburgh; Lombe Atthill of Dublin; Robert Greenhalgh; J. Knowlsley Thornton of London; the magical operator and despiser of antiseptics, Lawson Tait of Birmingham etc.

Among the

f. Americans,

during the early years of the present century, the chair of obstetrics seems to have been looked upon as a rather obnoxious but necessary appendage to the medical faculty, and the instruction in this branch was accordingly assigned to the professor of one or another of the more important branches, as the circumstances of each faculty appeared to require. King's College, New York, was organized originally, as we have seen, with an independent chair of midwifery, but in the College of Philadelphia obstetrical instruction was given by Dr. Shippen, the professor of anatomy, the Medical Department of Harvard College was organized without any chair of obstetrics, and if obstetrical instruction was imparted at all in the Medical School of Dartmouth College it must have been done by the omniscient Nathan Smith, who for twelve years constituted the entire Faculty of that institution. In 1825 the same Nathan Smith was Prof. of the Theory and Practice of Physic, Surgery and Obstetrics in the Med. Dept. of Yale College, and about the same period Reuben D. Mussey was Prof. of Anatomy, Surgery and Obstetrics in the Medical School of Dartmouth College. On the death of Dr. Tennent, the first professor of midwifery in King's College, his chair was taken by Dr. Samuel Bard, whom we have heretofore had occasion to notice, and Dr. Bard has the honor of being the author of the first work on the subject of midwifery published in this country. This was a "Compendium of the theory and practice of midwifery etc.", published in 1807 and sufficiently popular to attain a fifth edition by 1819. The sober conscientiousness of Dr. Bard's obstetrical teachings, at least in later life, may be inferred from the following extract:

> "I confess, not without severe regret, that towards the end of thirty years' practice I found much less occasion for the use of instruments than I did in the beginning; and I believe we may certainly conclude that the person who, in proportion to the extent of his practice, meets with most frequent occasion for the use of instruments,

knows least of the powers of nature, and that he who boasts of his skill and success in their application is a very dangerous man."

On the organization of the College of Physicians and Surgeons of New York in 1807 the department of obstetrical instruction was assigned to Dr. David Hosack, who was also Prof. of materia medica and botany and lecturer on surgery. In the following year, however, the chair of Obstetrics and the Diseases of Women and Children was assigned to Dr. William James Macneven, an Irishman by birth and an alumnus of the University of Vienna. Dr. Macneven's tastes inclined more to chemistry than to midwifery, and accordingly, on the reorganization of the faculty and the consolidation of the two medical schools of Columbia (formerly King's) College and the College of Physicians and Surgeons in 1814, he was assigned to the chair of chemistry and Dr. John C. Osborn received the chair of obstetrics and the diseases of women and children. In 1826 Dr. Osborn was succeeded by Dr. Edward Delafield, who in 1841 was in turn succeeded by Dr. Chandler R. Gilman. The latter in 1843 organized the first gynæcological clinic of this college, and edited in 1845 an American edition of Maunsell's "Dublin Practice of Midwifery". In conjunction with Dr. Theo. Tellkampf he also published in 1847 a translation of Bischoff's "Periodic Maturation and Discharge of Ova in the Mammalia and the Human Female". On the death of Dr. Gilman in 1865 he was succeeded by Dr. T. Gaillard Thomas, of whom we shall speak more fully hereafter.

In the Medical Dept. of the University of Pennsylvania, on the death of Dr. Shippen in 1808, the chair of obstetrics was separated from that of anatomy, and in 1810 the former was assigned to

THOMAS C. JAMES (1766–1835),

a pupil of John Hunter, who had for a considerable period been a successful practitioner of obstetrics in Philadelphia and had been influential in organizing a lying-in department in the hospital of the city alms-house. Dr. James was obstetrician to the Pennsylvania Hospital for many years and edited American editions of Merriman's "Synopsis" and Burns's "Principles of midwifery". From the year 1825 failing health compelled him to resign a large part of his duties as an obstetrical teacher to his assistant, and in 1834 he resigned his position to the famous

WILLIAM POTTS DEWEES (1768–1841),

"a man whose genius left its impress upon American obstetrics more decidedly than that of any other has done before or since" (Thomas). Upon Dr. Dewees had fallen for nearly ten years the responsibility of the greater part of the obstetrical teaching of the University of Pennsylvania, and his decided opinions and vigorous style contributed largely to elevate the grade of obstetrical practice in the United States. His "Comprehensive System of Midwifery" (1824), which attained a 12th edition, "Treatise on the Physical and Medical Treatment of Children" (1825) and "Treatise on the Diseases of Females" (1826), each of which reached the 10th edition, were all works of originality and sterling worth. Of his "Midwifery" his successor, Dr. Hodge, declared that "it takes a stand decidedly in advance of Denman, Osborne, Burns and other English authorities in general use in our country at that period, and even of

Baudelocque himself in throwing aside from his excellent system much that was useless and, it may be said, imaginative."

The mantle of Dewees fell upon the able shoulders of

HUGH L. HODGE (1796–1873),

a native of Philadelphia, pupil of Caspar Wistar and an alumnus of the University of Pennsylvania. Dr. Hodge was also a man of originality and independence, and his teachings bore the stamp of his character. In obstetrics he inculcated the use of the forceps as compressors, the induction of premature labor in deformities of the pelvis, synclitism of the fœtal head, mechanical support in prevention of habitual abortion etc., and in gynæcology he emphasized the fact that enlargement, tenderness, congestion and hypersecretion of the uterus by no means necessarily imply "inflammation", but are perhaps most frequently due to mere "irritation", the result of displacement, and are most readily and surely relieved by restoring the uterus to its normal position and retaining it there. His mechanical ingenuity is displayed in the invention of the well-known double lever pessary, "Hodge's forceps" (the instrument more generally used than any other in this country), a compressor cranii, craniotomy scissors and placental forceps. Of his pessary Dr. Thomas says that by its invention "he accomplished more for mechanical support of the uterus than any one has ever done before or since his time." —

A contemporary of both the foregoing physicians was the equally eminent

CHARLES DELUCENA MEIGS (1792–1869),

a native of Bermuda and Professor of Obstetrics in Jefferson College, Philadelphia, from 1840 to 1862. He was the first to direct attention to cardiac thrombosis as the cause of sudden death in childbed (1849), and while quaint and antique in style, was unquestionably a forcible and successful teacher. His chief works were: "Woman, her Diseases and Remedies" (1847); "Obstetrics, the Science and Art" (1849); "A Treatise on Acute and Chronic Diseases of the Neck of the Uterus" (1850). Both Dewees and Meigs inculcated the non-contagious character of puerperal fever, a doctrine which was strongly controverted by the famous Oliver Wendell Holmes in 1843. — Another obstetrical contemporary of all the three physicians just mentioned was

HENRY MILLER (1800–1874),

Professor of Obstetrics and the Diseases of Women in the University of Louisville from its organization in 1835, and an influential writer and teacher for many years. To him we owe the method of applying fluids to the uterine cavity by means of cotton-wrapped probes, and he was the first physician west of the Alleghany mountains to employ anæsthesia in midwifery, and one of the first to use the speculum uteri (Thomas). His chief works were: "A Theoretical and Practical Treatise on Human Parturition" (1849), and "The Principles and Practice of Obstetrics" (1858).

Another popular teacher and systematic writer on obstetrics and the diseases of women and children was

GUNNING S. BEDFORD (1806–1870) of Baltimore,

Professor of Obstetrics in the Medical Department of the New York University from about 1840 to 1862, and the founder of the first gynæcological clinic established in this country (1841). Dr. Bedford was a most enthusiastic and successful teacher, and his works are still looked upon as standard in their department of medicine. He published in 1855 "Clinical Lectures on the Diseases of Women and Children", and in 1861, "The Principles and Practice of Obstetrics".

A distinguished obstetrician of Boston in the first half of the present century was

WALTER CHANNING (1786–1876),

an alumnus of Edinburgh and the first Professor of Obstetrics and Medical Jurisprudence (1815–1854) in Harvard College. Though author of no systematic work in his department, he was a highly esteemed teacher and writer, and is particularly eminent as one of the first (he was preceded only by Dr. N. C. Keep of Boston) in the United States to employ, and the first to advocate in writing the use of, anæsthesia in midwifery. His "Treatise on Etherization in Child-birth, illustrated by 581 cases", Boston, 1849, was a convincing argument as to the advantages of the new method.

The genial and erudite

JOHN WAKEFIELD FRANCIS (1789–1861) of New York,

a pupil and subsequently the partner of Dr. Hosack, with whom he edited (1810–1814) the "American Medical and Philosophical Register", also deserves mention in this place. He held the chair of obstetrics in the College of Physicians and Surgeons, New York, in 1819, and subsequently (1826–1830) in Rutgers Medical College, but was more distinguished by his devotion to general literature, his eloquence and his erudition, than as an obstetrician. In the latter capacity, however, he edited an edition of Denman's Midwifery in 1821, which he supplied with copious and valuable annotations.

Among the more recent systematic writers on obstetrics we may notice: William H. Byford, Prof. of Obstetrics etc. in the Chicago Medical College (A Treatise on the Theory and Practice of Obstetrics, 1870); William T. Lusk, Prof. of Obstetrics etc., in Bellevue Hospital Medical College, New York (The Science and Art of Midwifery, 1882); Theophilus Parvin, Prof. of Obstetrics etc. in Jefferson Medical College, Philadelphia (The Science and Art of Obstetrics, 1886), and the various contributors to the American System of Obstetrics edited by Dr. B. C. Hirst, Philadelphia, 1888.

Obstetric manuals of more or less completeness have been published by: Valentine Seaman (The midwife's monitor and mother's mirror, New York, 1800); Joseph Warrington (The obstetric catechism, 1842); Thomas F. Cock (A manual of obstetrics, New York, 1853), and the more recent works of A. F. A. King of Washington and Henry G. Landis of Columbus, Ohio.

Among our almost innumerable recent writers on special obstetric themes we have space to mention only George T. Elliot (died 1871; The Obstetric Clinic, 1868); Fordyce Barker (The Puerperal Diseases, 1874) and John S. Parry (Extra-uterine Pregnancy etc., 1876).

In Gynæcology, a department in which American medicine has won, perhaps, its most numerous and most enduring laurels, mention has been already made of the introduction of ovariotomy by Ephraim McDowell in 1809. He was followed by Nathan Smith in 1821, and before 1850 no less than 36 ovariotomies had been performed by 18 operators, with a record of 21 recoveries and 15 deaths (Thomas). Most of the obstetricians whose names have been mentioned above also devoted attention to the diseases of women, but the appearance of gynæcology as a distinct specialty may be said to date from the invention by Dr. J. Marion Sims of his well-known speculum[1] in 1852, and his demonstration of the proper method for the treatment of vesico-vaginal fistulæ. Dr. Sims settled in New York in 1853 and, mainly through his influence, there was established in that city in 1855 a temporary Woman's Hospital, which speedily developed into the magnificent institution of that name chartered in 1858 and opened in 1866. The path thus opened by Dr. Sims was enlarged and improved by T. Addis Emmet and T. Gaillard Thomas of New York and Horatio R. Storer of Boston, and to these four physicians may be justly ascribed the foundation of American gynæcology as a special department of practice.

Of the contributions of American physicians to this department of medicine it would require a distinct volume to constitute a complete record, and we must content ourselves with merely presenting the names of the more eminent of its representatives : John Light Atlee (1799–1855) of Lancaster, Penn., and his brother Washington Light Atlee (1808–1878) of Philadelphia, both eminent pioneers in the operation of ovariotomy, the former of whom performed his first operation in 1843 and the latter in 1844 ; Alexander Dunlap of Springfield, Ohio, who also operated in 1843 ; Edmund Randolph Peaslee (1814–1878) of New York, whose first ovariotomy was performed in 1850 (Human Histology, 1857 ; Ovarian Tumours ; their Pathology, Diagnosis and Treatment, especially by Ovariotomy, 1872); Gilman Kimball of Lowell, Mass.; Charles A. Budd (1832–1877) of New York ; J. C. Nott of Mobile ; W. H. Byford of Chicago (The Medical and Surgical Treatment of Women, 1865); Horatio R. Storer of Boston ; T. Gaillard Thomas of New York (A Practical Treatise upon the Diseases of Women, 1868 ; Thomas Addis Emmet of New York (The Principles and Practice of Gynæcology, 1879) ; Nathan Bozeman of New York ; Robert Batty of Atlanta, Ga. (extirpation of the ovaries, 1872); James T. White of Buffalo, N. Y.; Alex. J. C. Skene of Brooklyn, N. Y. (A Text-Book on the Diseases of Women, 1889); Emil Noeggerath of New York (latent gonorrhœa in females, 1872) ; E. N. Chapman of Brooklyn, N. Y. (Hysterology, 1872) ; William Goodell of Philadelphia ; D. Hayes Agnew of Philadelphia (Laceration of the perineum, 1873) ; R. A. F. Penrose of Philadelphia ; the venerable Isaac E. Taylor of New York ; Edward W. Jenks of Detroit, Michigan ; Samuel C. Busey of Washington ; William M. Polk of New York ; Ely Van de Warker of Syracuse, N. Y.; H. P. C. Wilson of Baltimore ; W. Gill Wylie, Montrose A. Pallen and Joseph E. Janvrin, all of New York, etc.

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1. According to Ali Cohen, the Talmudists were acquainted with a speculum vaginæ, conical in shape and made of lead with inverted edges. It was called the "sipherophot", and was undoubtedly of late Greek origin. A rod carrying a piece of charpie was introduced through it by the women, with the object of determining whether hæmorrhages proceeded from the uterus or the vagina— a question of sexual ritual. (Baas).

The New York Obstetrical Society was founded in 1863, the Boston Gynæcological Society in 1869 and the American Gynæcological Society in 1876. Among the

g. Dutch

Adriaan van Solingen (1759–1830) excited much discussion by his maxim that in labor "the smallest diameter of the head always occupies the pelvic diameter", while Gerardus Vrolik (1775–1859) rendered eminent service to our knowledge of the pelvis and its measurements. Wellenbergh; Baarth; Hendrik Jan Broers (1815–1876) in Utrecht; Joachim L. Kymmel (history of the forceps); Dr. G. Salomon (1774–1864) of Königsberg, who emigrated to Holland in 1797; A. H. Schoemaker (1834–1885) in Borne (Overyssel); Jacob Baart de la Faille (born 1822) in Groningen; Tjalling Halbertsma in Utrecht; Abraham E. Simon Thomas in Leyden; L. C. van Goudoever in Utrecht and Leopold Lehmann in Amsterdam, have all distinguished themselves as obstetrical teachers. — Among the

h. Belgians

Jean Baptiste Van Heuvel (1802–1883) of Brussels was widely known through his pelvimeter and his forceps-saw, and recently Édouard Hervieux[1] of Paris has acquired considerable distinction (Traité clinique et pratique des maladies puerpérales, suite de couches, Paris, 1870). — Among the

i. Norwegians

the following physicians have rendered themselves prominent as writers on midwifery and professors of this branch in the University of Christiania, founded in 1811: Magnus Andreas Thulstrup (1769–1844), also a surgeon, as most obstetricians of that time were (and are still); his successor, tolerably well known also in Germany, Frans Christian Faye (born 1806), a writer on midwifery and the diseases of women and children, and E. Schoenberg, still an active teacher of this branch. — In

k. Denmark

the Saxtorphs, father and son, were active and distinguished obstetricians. The following physicians of more recent date likewise deserve mention: A. S. Stadtfeldt, Emmerick Ingerslev and Frantz J. A. C. Howitz (a gynæcologist and active ovariotomist), all in Copenhagen. — In

l. Finland

Joseph Adam Joakim Pippingsköld, Prof. of Obstetrics and Pædiatrics in the University of Helsingfors, is an eminent teacher, while in

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[1] As M. Hervieux is said to have been born in Louviers (Eure) and is physician to the Maternité in Paris, I do not know why the author classes him among the Belgians. (H.)

m. Sweden

Frederik August Cederschioeld, son of Gustaf Cederschioeld (1782–1848), is an active teacher in Stockholm, and in

n. Greece

Miltiades Welizelos (died 1887) was an eminent obstetrician and professor in Athens. He was educated in Germany, chiefly in Berlin, and even attained the position of a Minister, doubtless the first obstetrician who ever won such advancement.

On the whole, as regards surgery and midwifery even at the present day, the remarks of Sprengel hold good: "While the physicians of the most ancient, as well as the most recent times have so gravely misconceived their art as to seek to raise it to the dignity of a science (an effort utterly opposed to its very nature), true surgeons, on the contrary, have never transgressed the limits of their knowledge and their capabilities. While the sons of Æsculapius, to whom the Muses have never been very propitious, have ever made themselves contemptible by a fruitless adherence to the philosophical schools of their day, we never observe in surgery this barren struggle. While physicians have always endeavored to conceal their want of clear ideas by a silly display of new and pompous, foreign and incomprehensible words, so in the writings of the great surgeons are to be found rather simplicity and clearness, definiteness and dignity. Hence it has resulted that surgery has never gone backwards, and that after making some slight advances it has never lapsed again into the ancient barbarity. The quiescence which it experienced during the Middle Ages is readily explicable, but since that period it has been held back only by the pressure which it has suffered from the arrogance of the physicians." The last statement is no longer true, but the following remark is commended to the reflection of every earnest reader: "In fact my veneration for surgical art . . . . has become greater and purer, the more depressing the history of medicine is to me and to every friend of the truth." Would that medicine too might attain simplicity and clearness, definiteness and dignity in its writings!

Particularly in reading the history of medicine every thoughtful reader must hope that the fatal inclination to philosophical systems and the dogmas of the day, so manifest in medical art, may finally cease: for it has been proven by centuries of experience that neither one-sided idealistic, nor yet one-sided materialistic and mechanical theories, can be of permanent advantage to it. On the contrary, it is manifest that medicine has always advanced only so far as it rendered both of these systems useful, and while it followed the only correct path — the path of thoughtful experience.

FINIS.

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CORRIGENDA ET ADDENDA.

In addition to ordinary typographical errors, and errors of names and dates corrected in the Index of Names, the following corrections and additions are of sufficient importance to require notice:

Page 57, line 2 from the top, read "Arbor" instead of "Harbor."
" 61, line 16 from the bottom, read "1884" instead of "1834."
" 61, line 23 from the bottom, read "Ammasan" instead of "Ammasau."
" 67, line 13 from the bottom, read "Iatri" instead of "Tatri."
" 67, line 25 from the bottom, read "Iatri" instead of "Tatri."
" 69, line 16 from the top, read "Inwulu" and "Isinjanja" instead of "Tnwulu" and "Tsinjanja."
" 69, line 19 from the top, read "Itongo" instead of "Ttongo."
" 69, line 14 from the bottom, read "Minungo" instead of "Minnugs."
" 71, line 16 from the bottom, read "Cattwy" instead of "Cettwy."
" 138, line 6 from the top, insert "general" before "pathology."
" 177, line 2 from the bottom, read "periscythismus" instead of "periscinthismus".
" 178, line 16 from the bottom, read "angiology" instead of "anthiology".
" 220, line 14 from the bottom, insert "the university was" before "founded".
" 241, line 13 from bottom, read "Sveinbjoernsen" instead of "Sveinbjornsen".
" 248, line 3 from the bottom, read "Judrun" instead of "Indrun".
" 283, line 21 from the bottom, read "Autricours" instead of "Audicours".
" 289, line 20 from the top, read "booksellers (Sortimenter)" instead of "agents (Sartimenter)".
" 306, line 10 from the bottom, should read "His salary was £40 a year and twelve pence a day for subsistence", and a similar correction should be made in the succeeding line.
" 338, lines 5 and 6 from the bottom, should read "Slaghoek, the uncle of Dneveke, mistress etc."
" 344, line 12 from the bottom, read "Franconian", instead of "French."
" 348, line 19 from the bottom, read "Sibenzüchter" instead of "Libenzüchter".
" 352, line 17 from the bottom, read "Chalcondylas" instead of "Chalcondyles".
" 361, lines 14 and 15 from the top, should read "for teaching, and not (as they are to-day) for investigation."
" 371, line 16 from the top, read "Grien" instead of "Grier".
" 371, line 23 from the top, read "Fossombrone" instead of "Tossembrone".
" 382, line 12 from the bottom, read "an oil-cask" instead of "elephantiasis."
" 396, line 20 from the top, insert "(Proksch)" after "species".
" 403, lines 8 and 7 from the bottom, should read: "Item ob das kind sich mitt dem hindern erzeugte, so soll die hebamm mit yngelassner hâ das kind über sich heben und mit den fuessen uszführen."
" 407, line 1 from bottom read φιλεῖν instead of ζ'ιλεῖν.
" 415, line 6 from the bottom, read "Zeccarelli" instead of "Zaccarelli
" 419, line 1 from the top, read "brother" instead of "son".
" 434, line 1 from the top, read "Nützliche" instead of "Nützlichen."
" 434, line 6 from the bottom, read "Physic" instead of "Physics".
" 436, line 26 from the top, read "Alexandrinæ" instead of "alephangin
" 437, line 20 from the bottom, read "Raitenau" instead of "Raitman."
" 512, line 2 from the top, read "then" instead of "than".

Page 648, line 22 from the top, should read, "was literally cast out of doors by his cruel father, a merchant."

" 649, line 4 should read: "On one occasion, when eight physicians were sitting beside his dying bed, Frank remarked etc."

" 664, line 8 from the top, strike out "and".

" 665, line 13 from the top, read "Josephine" instead of "Joseph".

" 685, line 22 from the top, read "Schacher" instead of "Schaber".

" 771, line 8 from the bottom, replace — with 755.

" 906, line 3 from bottom. According to the careful and independent investigations of Dr. Baas, Récamier invented and employed the speculum in his clinic in 1805–6.

" 933, line 21 from the top, read "highlands of Baden" instead of "Bavarian highlands".

" 961, line 15 from the top. This passage should read as follows:

HERMANN ZEISSL (1817–1884)

author of a "Lehrbuch" and "Compendium" of syphilis, and

JOH. KARL PROKSCH of Vienna

(born 1840 at Jaegerndorf in Austrian Silesia), who shows himself in his works a gifted and thorough investigator of the theory and literature of syphilis. An anti-mercurialist in therapeutics, Proksch is the author of important works on the history and literature of his specialty, and has likewise written numerous severe, but just, critiques, particularly upon the writings of Zeissl.

" 969, To the representatives of the New Vienna School should be added:

THEODOR PUSCHMANN (born 1847),

who since 1879 has occupied the chair of the History of Medicine in the University of Vienna, edited a valuable edition of the works of Alexander Trallianus, and is the author of numerous other medico-historical writings.

" 1005, line 6 from the bottom, read "1841" instead of "1821".

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